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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Standard

NATIONAL AIRSPACE SYSTEM (NAS)

OPEN SYSTEM ARCHITECTURE AND PROTOCOLS

FOREWORD

This standard establishes a data communications architecture and defines the protocol services and Profile Requirement List (PRL) associated with protocols standards for open systems communications within the National Airspace System (NAS).. PRL's have been included in the Ground to Ground (G-G) Router/User IRD and the purpose is to be specific concerning the protocols and their interactions between the interfacing systems, this enhances the probability that the interfacing systems will correctly interoperate.

The architecture defined in this standard is based on the seven layer, Open Systems Interconnection (OSI) Basic Reference Model, as described in the International Organization for Standardization (ISO) document 7498-1.

The NAS will consist of various types of processors and communications networks procured from a variety of vendors. A well- defined data communications architecture is required to ensure interoperability between NAS open end systems. Additional operational requirements are contained in section 6 of this document.

This standard includes definitions in section 6.1.

This Standard also provides Protocol Implementation Conformance Statement (PICS) Proforma / Profile Requirements List (PRL) for the applicable ISO standards in the Appendices

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1. SCOPE

1.1 Scope. This standard specifies a minimal set of protocol and service requirements for the National Airspace System (NAS). The minimum set defined herein may exceed the minimal requirements for a particular end-system, but is necessary to facilitate interoperability. Additional protocols, and services and Profile Requirement List (PRL)/Protocol Implementation Conformance Statement (PICS) are added to insure conformance and interoperability between end systems, intermedia and subsystems. may be implemented for interfacing NAS open end systems by mutual agreement. Requirements for NAS open end system connectivity to the Aeronautical Telecommunication Network (ATN) are contained in the International Civil Aviation Organization (ICAO)/ ATN Manual.

The communications architecture and protocols described herein is intended to be used by Federal Aviation Administration (FAA) in the development of interface requirements as part of the design, procurement, and overall data communications planning of the NAS.

Additional information for open end systems, services and options can be obtained from NAS Open System Architecture and Protocol Users Guide.

1.2 Purpose. The purpose of this standard is to establish a communications architecture for the modernization of NAS data communication systems. This standard also facilitates a migration for the implementation of OSI standards [ISO, International Telegraph and Telephone Consultative Committee (CCITT), has become International Telecommunication Union-Telecommunication (ITU-T), as of February 1993. American National Standards Institute (ANSI)] for existing NAS end-systems. It also facilitates interoperability of these systems. The communications architecture defined in this standard will incorporate FAA-developed standards, which are OSI compliant, where international/national standards are not available or feasible in meeting NAS-specific data communications requirements.

2. APPLICABLE DOCUMENTS

2.1 Government Documents. The following documents form a part of this standard to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this standard, the contents of this standard shall be considered the superseding requirement.

FAA Standards.

FAA-STD-042a: 1994 Interconnection	National Airspace System (NAS) Open Systems (OSI) Naming and Addressing
FAA-STD-043a: 1994 Interconnection	National Airspace System (NAS) Open Systems (OSI) Priority.

FAA-STD-044: 1992 National Airspace System (NAS) Open Systems
Interconnection (OSI) Directory Services.

FAA-STD-045: 1994 National Airspace System (NAS) Open System
Interconnection (OSI) security Architecture Protocols and
mechanism.

FAA-STD-047: 1993 National Airspace System (NAS) Open System
Interconnection (OSI) Conformance Testing.

FAA-STD-048: 1995 National Airspace System (NAS) Open System
Interconnection (OSI) Interoperability Testing.

FAA-STD-049: 1994 National Airspace System (NAS) Open System
Telecommunication Interconnection (OSI) Fiber Optic
Systems and equipment.

Federal Standards.

FED-STD-1020A: 1981 Electrical Characteristics of Balanced Voltage
Digital Interface Circuits.

FAA-STD-1020A: 1981 Electrical Characteristics of Balanced Voltage
Digital Interface Circuits

FED-STD-1030A: 1981 Electrical Characteristics of Unbalanced Voltage
Digital Interface Circuits.

*FED-STD-1032 High Speed 25-position Interface for Data
Terminal *Equipment and Data Circuit-Terminating Equipment

FIPS PUB 107: 1984 BasebandBaseband Carrier Sense Multiple Access
with Collision Detection Access Method and Physical Layer
Specifications and Link Layer Protocol.

*FIPS PUB 146-1 Government Open Systems Interconnection Profile
* (GOSIP), Version 2.0

FIPS PUB 154 : 1988 High Speed 25-position Interface for Data
Terminating Equipment and Data Circuit-Terminating Equipment.

National Institute of Standards and Technology.

NIST SP-500-206: 1993 Stable Implementation Agreements for OSI
Protocols, Version 6,
Addition 1.

2.2 Non-Government Documents.

**Electronic Industries Association (EIA) / Telecommunications Industries
Association (TIA).**

EIA-232D/E: 1991 Serial Binary	Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Data Interchange.
EIA-530: 1987 Terminal Equipment	High Speed 25-position Interface for Data and Data Circuit-Terminating Equipment.
RS-232C: 1981 Data Circuit- Data Interchange.	Interface Between Data Terminal Equipment and Terminating Equipment Employing Serial Binary
RS-422A: 1978 Digital Interface	Electrical Characteristics of Balanced Voltage Circuits.
RS-423A: 1978 Digital Interface	Electrical Characteristics of Unbalanced Voltage Circuits.

International Civil Aviation Organization (ICAO).

ICAO ATN Manual: 1993 Manual of the Aeronautical Telecommunication
Network, Second
Edition.

**International Telecommunications Union - Telecommunication (ITU-
T)/International**

Telegraph and Telephone Consultative Committee (CCITT).

CCITT V.24m: 1980 Between Data Equipment.	List of Definitions for Interchange Circuits Terminal Equipment and Data Circuit-Terminating
CCITT V.28: 1980 Current	Electrical Characteristics for Unbalanced Double- Interchange Circuits.
CCITT V.32A: 1984 signaling	Family of 2-wire, Duplex Modems Operating at Data

Switched Circuits.	Rates of Up to 9600 Bit/s for use on the General Telephone Network and on Leased Telephone-Type
CCITT V.35: 1980 60-108 Khz	Data Transmission at 48 Kilobits Per Second Using Group Band Circuits.
CCITT X.21 bis: 1984 Equipment Synchronous V-	Use on Public Data Networks of Data Terminal (DTE) Which is Designed for Interfacing to Series Modems.
CCITT X.25: 1984 and Data Operating	Interface Between Data Terminal Equipment (DTE) Circuit-Terminating Equipment (DCE) for Terminals in the Packet Mode on Public Data Networks.
CCITT X.29: 1984 Information and User Facility	Procedures for the Exchange of Control Data Between a Packet Assembly/Disassembly (PAD) and a Packet Mode DTE. or Another PAD.
CCITT X.32: 1984 and Data Operating Public Data Network or a	Interface Between Data Terminal Equipment (DTE) Circuit-Terminating Equipment (DCE) for Terminals in Packet-Mode and Accessing a Packet Switched Network through a Public Switched Telephone Circuit Switched Public Data Network.

International Organization for Standardization (ISO) .

ISO 2110: 1989 Pin Data Terminating Number	Information Technology - Data Communication - 25- Terminal Equipment (DTE) and Data Circuit - Equipment (DCE) Interface Connector and Contact Assignments, 3rd Edition.
ISO 2593: 1993 Equipment (DTE) Interface	Data Communication - 34-Pin Data Terminal and Data Circuit-Terminating Equipment (DCE) Connector and Pin Assignments, 2nd Edition.
ISO 3309: 1992 Communication - High- Structure, 3rd	Information Processing Systems - Data level Data Link Control Procedures - Frame

	Edition.
ISO 4335: 1993 Communication - High- Elements	Information Processing Systems - Data Level Data Link Control (HDLC) Consolidation of Procedures, 3rd Edition.
ISO 7478: 1987 Communication -	Information Processing Systems - Data Multilink Procedures, 1st Edition.
ISO 7498-1: 1984 Interconnection	Information Processing Systems - Open Systems - Part 1: Basic Reference Model, 1st Edition.
*ISO/IEC 7498-2:1989 *Interconnection	*Information Processing Systems - Open Systems - Basic Reference Model - Part 2: Security *Architecture, 1st Edition
ISO/IEC 7498-3: 1989 Interconnection Addressing, 1st	Information Processing Systems - Open Systems - Basic Reference Model - Part 3: Naming and Edition.
ISO/IEC 7498-4: 1989 Interconnection Framework, 1st	Information Processing Systems - Open Systems - Basic Reference Model - Part 4: Management Edition.
ISO 7776: 1987 Communication - High- Description of the X.25 Version 1.	Information Processing Systems - Data Level Data Link Control Procedures - LAPB - Compatible DTE Data Link Procedures,
ISO 7776: 1992/DAM 1 Communication - High- of the X.25 Amendment 1:	Information Processing Systems - Data Level Data Link Control Procedures - Description LAPB - Compatible DTE Data Link Procedures, Conformance Requirements.
ISO 7809: 1993 Communication - High- Consolidation of Classes	Information Processing Systems - Data Level Data Link Control Procedures - of Procedures, 1st Edition.
ISO 8072: 1986 Interconnection -	Information Processing Systems - Open System Transport Service Definition, 1st Edition.

ISO/IEC 8073: 1988 Interconnection Specification, 2nd	Information Processing Systems - Open Systems - Connection Oriented Transport Protocol Edition.
ISO/IEC 8073: 1988/ Interconnection AD2: 1989 Specification - Connectionless	Information Processing Systems - Open Systems - Connection Oriented Transport Protocol Addendum 2: Class Four Operation Over Network Service.
ISO/IEC 8073: 1988 Systems Implementation	Information Processing Systems - Am 3: 1991 Open Interconnection - Connection Transport Protocol Specification - Amendment 3: Protocol Conformance Statement (PICS) Proforma.
ISO/IEC 8208: 1990 Communications - X.25 Equipment, 2nd	Information Processing Systems - Data Packet Level Protocol for Data Terminal Edition.
ISO/IEC 8208: 1990 Communications X.25 Am 3:	Information Processing Systems - Data Packet Level Protocol For Data Terminal Equipment Conformance requirement.
ISO 8326:1987 Interconnection Definition, 1st	Information Processing Systems - Open Systems Basic Connection Oriented Session Service Edition
ISO 8326/DAD2: 1988 Interconnection Definition -	Information Processing Systems - Open Systems - Basic Connection Oriented Session Service Addendum 2: Incorporation of Unlimited User Data,. June 1988
ISO 8327: 1987 Interconnection Specification, 1st	Information Processing Systems - Open Systems - Basic Connection Oriented Session Protocol Edition.
ISO 8327/DAD2: 1988 Interconnection Specification -	Information Processing Systems - Open Systems - Basic Connection Oriented Session Protocol

Systems -	Addendum 2: Incorporation of Unlimited User Data.
1st Edition.	Data Communications - Network Service Definition,
ISO 8348: 1993	Information Processing Systems - Data
Communications - Network	Service Definition - Addendum 1: Connectionless
Mode	Transmission.
ISO 8348: 1987	Information Processing Systems - AD2:1988 Data
Communications -	Network Service Definition - Addendum 2: Network
Layer Addressing.	
ISO 8473: 1988	Information Processing Systems - Data
Communications -	Protocol for Providing the Connectionless-Mmode
Network Service	(CLNS), 1st Edition.
ISO 8473: 1988/ Communications - AD3: 1989	Information Processing Systems - Data
Network Service -	Protocol for Providing the Connectionless-Mode
Assumed by	Addendum 3: Provision of the Underlying Service
Data Link Service,	ISO 8473 over Subnetworks which Provide the OSI
	1st Edition.
ISO 8473-1: 1994	Information Processing Systems - Data
Communications -	Protocol for Providing the Connectionless-Mmode
Network	Service: Protocol Specification.
ISO 8473-2: 1994	Information Processing Systems - Data
Communications -	- Protocol for Providing the Connectionless-Mode
Network	Service - Part 2: Provision of the Underlying
Service by an	ISO/IEC 8802 Subnetwork.
ISO 8473-3: 1994	Information Processing Systems - Data
Communications -	Protocol for Providing the Connectionless-Mode
Network	Service - Part 3: Provision of the Underlying
Service by	X.25 Subnetwork.
ISO 8571-1: 1988	Information Processing Systems - Open Systems
Interconnection	

1: General	- File Transfer, Access, and Management - Part Introduction, 1st Edition.
ISO 8571-2: 1988 Interconnection	Information Processing Systems - Open Systems - File Transfer, Access, and Management - Part
2: Virtual	Filestore Definition, 1st Edition.
ISO 8571-3: 1988 Interconnection	Information Processing Systems - Open Systems - File Transfer, Access, and Management - Part
3: File Service	Definition, 1st Edition.
ISO 8571-4: 1988 Interconnection	Information Processing Systems - Open Systems - File Transfer, Access, and Management - Part
4: File Protocol	Specification, 1st Edition.
ISO 8571-5: 1990 Interconnection Protocol	Information Processing Systems - Open Systems - File Transfer, Access, and Management - Part 5: Implementation Conformance Statement Proforma.
ISO 8602: 1987 Interconnection Transport	Information Processing Systems - Open Systems - Protocol for Providing the Connectionless-mode Service, 1st Edition.
ISO 8648: 1988 Interconnection Edition.	Information Processing Systems - Open Systems - Internal Organization of the Network Layer, 1st
ISO 8649: 1988 Interconnection Service Element,	Information Processing Systems - Open Systems - Service Definition for the Association Control 1st Edition.
ISO 8650: 1988 Interconnection Control Service	Information Processing Systems - Open Systems - Protocol Specification for the Association Element, 1st Edition.
ISO DIS 8650-2: 1992 Interconnection Control Service Conformance	Information Processing Systems - Open Systems - Protocol Specification for the Association Element - Part 2: Protocol Implementation

	Statement (PICS) Proforma. (PICS)
ISO/IEC 8802-2: 1990 Networks - Part 2:	Information Processing Systems - Local Area Logical Link Control, 1st Edition.
ISO/IEC 8802-3: 1990 Networks - Part 3: Detection Specifications,	Information Processing Systems - Local Area Carrier Sense Multiple Access with Collision (CSMA/CD) Access Method and Physical Layer 2nd Edition.
ISO/IEC 8802-4: 1990 Networks - Part 4: Layer	Information Processing Systems - Local Area Token-Passing Bus Access Method and Physical Specifications, 1st Edition.
ISO/IEC 8802-5: 1990 Networks - Part 5: Specification, 1st	Information Processing Systems -Local Area Token Ring Access Method and Physical Layer Edition.
ISO 8822: 1988 Interconnection Definition, 1st	Information Processing Systems - Open Systems - Connection Oriented Presentation Service Edition.
ISO 8823: 1988 Interconnection Specification, 1st	Information Processing Systems - Open Systems - Connection Oriented Presentation Protocol Edition.
ISO DIS 8823-2: 1992 Interconnection Specification - Part (PICS)	Information Processing Systems - Open Systems - Connection Oriented Presentation Protocol 2: Protocol Implementation Conformance Statement Proforma. (PICS)
ISO 8824: 1987 Interconnection (ASN.1), 1st	Information Processing Systems - Open Systems - Specification of Abstract Syntax Notation One Edition.
ISO 8825: 1987 Interconnection Abstract Syntax	Information Processing Systems - Open Systems - Specification of Basic Encoding Rules for Notation One (ASN.1), 1st Edition.

ISO 8878: 198792	Information Processing Systems - Data Communications - Use of X.25 to Provide the OSI Connection-mode Network Service
	(CONS), 1st Edition.
ISO 8880-1: 1988	Information Processing Systems - Protocol
Combinations to	Provide and Support the OSI Network Service -
Part 1: General	Principles, 1st Edition.
ISO 8880-2: 198892	Information Processing Systems - Protocol
Combinations to	Provide and Support the OSI Network Service -
Part 2: Provision	and Support of the Connection-Mode Network
Service, 1st	Edition.
ISO 8880-3: 1988	Information Processing Systems - Protocol
Combinations to	Provide and Support the OSI Network Service -
Part 3: Provision	and Support of the Connectionless-Mode Network
Service, 1st	Edition.
ISO/IEC 8886: 1992	Information Processing Systems - Data Communication - Data Link Service Definition for Open Systems Interconnection, . April 1992
ISO 9040: 1990	Information Processing Systems - Open Systems
Interconnection	- Virtual Terminal Basic Class Service, 1st
Edition.	
ISO 9041-1: 1990	Information Processing Systems - Open Systems
Interconnection	- Virtual Terminal Basic Class Protocol - Part 1:
Specification.	
ISO 9072-1: 1989	Information Processing Systems - Text
Communication - Remote	Operations - Part 1: Model, Notation and Service
Definition, 1st	Edition.
ISO 9072-2: 1989	Information Processing Systems - Text
Communication - Remote	Operations - Part 2: Protocol Specification, 1st
Edition.	
ISO 9314-1: 1989	Information Processing Systems - Fibreer
Distributed Data	

Interface (FDDI) - Part 1: Physical Layer
Protocol (PHY), 1st Edition.

ISO 9542: 1988 Information Processing Systems -
Telecommunications and Information Exchange Between Systems - End System
to Intermediate System Routing Exchange Protocol for
Use in Conjunction with the Protocol for Providing the
Connectionless- mode Network Service.

ISO 9542: 1994 Information Processing Systems -
Telecommunications and Information Exchange Between Systems - End System
to Intermediate System Routing Exchange Protocol for
Use in Conjunction with the Protocol for Providing the
Connectionless- Mode Network Service.

ISO 9545: 1989 Information Technology - Open System
Interconnection - Application
Layer Structure, 1st Edition.

ISO/IEC 10021-1: 1990 Information Processing - Text Communication -
Message Oriented Text Interchange System - Part 1:
System and Service Overview.

ISO/IEC 10021-2: 1990 Information Processing - Text Communication -
Message Oriented Text Interchange System - Part 2:
Overall Architecture.

ISO/IEC 10021-3: 1990 Information Processing - Text Communication -
Message Oriented Text Interchange System - Part 3:
Abstract Service Definition Conventions.

ISO/IEC 10021-4: 1990 Information Processing - Text Communication -
Message Oriented Text Interchange System - Part 4:
Message Transfer System: Abstract Service Definition and
Procedures.

ISO/IEC 10021-5: 1990 Information Processing - Text Communication -
Message Oriented Text Interchange System - Part 5:
Message Store: Abstract Service Definition.

ISO/IEC 10021-6: 1990 Message Protocol	Information Processing - Text Communication - Oriented Text Interchange System - Part 6: Specifications.
ISO/IEC 10021-7: 1990 Message Interpersonal	Information Processing - Text Communication - Oriented Text Interchange System - Part 7: Messaging System.
ISO/IEC 10026-1: 1992 Interconnection Model.	Information Processing Systems - Open Systems - Distributed Transaction Processing - Part 1:
ISO/IEC 10026-2: 1992 Interconnection Service Definition.	Information Processing Systems - Open Systems - Distributed Transaction Processing - Part 2:
ISO/IEC 10026-3: 1992 Interconnection Protocol	Information Processing Systems - Open Systems - Distributed Transaction Processing - Part 3: Specification.
ISO/IEC 10589: 1992 Information (IS) to IS - Protocol for uUse in Service.	Information Technology - Telecommunication and Exchange bBetween Systems - Intermediate System Intra-Domain Routing Information Exchange Conjunction with the Connectionless-mode Network
ISO/IEC 10747: 1993 Telecommunications and Exchange of Intermediate Systems	Information Processing Systems - Information Exchange bBetween Systems - Protocol Inter-Domain Routing Information aAmong to Support Forwarding of ISO 8473 PDUs.

2.3 Other Publications

NAS-Open System Architecture and Protocols and Protocols Users Guide: November 1994

3. REQUIREMENTS

3.1 General. This standard evolved from a requirement to provide a standard data communications architecture and protocols to facilitate the interconnection and

interoperability of NAS open end systems. NAS-SS-1000, Volume IV, paragraph 3.1.4.1, states that all interfaces shall conform to the ISO Basic Reference Model (ISO 7498-1). In addition, this standard supports convergence of FAA interfaces with OSI interface profiles to the extent compatible with specific FAA Mission elements, including the FAA primary mission to provide for " ...safe and efficient air traffic control...".

The implementation of an OSI architecture is specified as a general requirement, together with the use of appropriate ISO/CCITTITU/Institute of Electrical and Electronics Engineers (IEEE) and FAA-unique protocols for providing a set of standardized services. The protocol implementation requirements defined in this document are based on the Government Open Systems Interconnection Profile (GOSIP), FIPS PUB 146-1, and the Stable Implementation Agreements for OSI Protocols, NIST SP-500-206.

3.1.1 Acronyms and Abbreviations.

The following are definitions of acronyms and abbreviations used in this standard.

AC	Alter Context
ACA	Alter Context Acknowledge
ACSE	Association Control Service Element
AD	Addendum
AK	Acknowledgment
ALPS	Application Layer Protocol Standard
ALPSP	Application Layer Protocol Specification
ALS	Application Layer Structure
Am	Amendment
ANSI	American National Standards Institute
AP	Application Process
APDU	Application Protocol Data Unit
ARP	Abnormal Release Provider
ARU	Abnormal Release User
ASD	Abstract Service Definition
ASDC	Abstract Service Definition Conversion
ASE	Application Service Element
ASN	Abstract Syntax Notation

ATN	Aeronautical Telecommunication Network
BA	Balanced Asynchronous
BER	Basic Encoding Rules
BIS	Boundary Intermediate System
CCITT Committee	International Telegraph and Telephone Consultative
CLNS	Connectionless-mode Network Service
CLNPF	Connectionless Network Protocol Function
CLTS	Connectionless Transport Service
CO	Control Object
CONS	Connection-Oriented Network Service
COPSD	Connection Oriented Presentation Services Document
COTS	Connection- oriented Transport Service
CP	Connect Presentation
CPA	Connect Presentation Accept
CPR	Connect Presentation Reject
CR	Connection Request
CRC	Cyclic Redundancy Check
CSMA/CD	Carrier Sense Multiple Access/Collision Detection
CSNP	Complete Sequence Numbers Protocol Data Unit
D-Bit	Delivery Confirmation Bit
DAD	Draft Addendum
DC	Disconnected Confirm
DCE	Data Circuit-terminating Equipment
DIS	Draft International Standard
DISC	Disconnected
DLP	Data Link Protocol
DLPSP	Data Link Protocol Specification
DM	Disconnected Mode

DO	Display Object
DR	Disconnected Request
DT	Data
DTE	Data Terminal Equipment
DTP	Distributed Transaction Processing
ED	Expedited Data
EIA	Electronics Industries Association
ER	Error Report
ERP	Echo Reply
ERQ	Echo Request
ES	End-System
ES-IS RP	End System to Intermediate System Routing Protocol
FAA	Federal Aviation Administration
FALP	Function of Application Layer Protocols
FADU	File Access Data Unit
FDDI	Fiber Distributed Data Interface
FDLP	Function Data Link Protocols
FED	Federal
FIB	Forwarding Information Base
FIPS	Federal Information Processing Standards
FNLP	Function Network Layer Protocol
FPS	File Protocol Specification
FPLP	Function of Presentation Layer Protocol
FPLPS	Function of Physical Layer Protocol Standards
FRMR	Frame Reject
FSLP	Function of Session Layer Protocol
FSD	File Service Definition
FTAM	File Transfer Access and Management
FTLP	Function of Transport Layer Protocol

GFI	General Format Identifier
HDLC	High-level Data Link Control
I-frame	Information Frame
ICD	Interface Control Document
ICAO	International Civil Aviation Organization
IDRP	Inter-Domain Routing Protocol
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IMS	Interpersonal Messaging System
IONL	Internal Organization of the Network Layer
IPS	Information Processing Systems
IRD	Interface Requirements Document
IS	Intermediate System
IS-IS	Intermediate System to Intermediate System
ISO	International Organization for Standardization
kbps	kilo bits per second
kHz	kilo hertz
L1	Level 1
L2	Level 2
LAN	Local Area Network
LAPB	Link Access Procedure Balanced
LCI	Logical Channel Identifier
LCN	Local Communications Network
LLC	Logical Link Control
LL	Local Loopback
LL	Lower Layer
LSP	Link State Protocol Data Unit
MAC	Media Access Control

Max	Maximum
M-bit	More data bit
Mbps	Megabits per second
MHS	Message Handling Service
MLP	Multilink Procedure
MOTIS	Message Oriented Test Interchange System
MSN	Message Switched Network
MTS	Message Transfer System
NA	Naming and Addressing
NADIN	National Airspace Data Interchange Network
NAS	National Airspace System
NBS	National Bureau of Standards
NCM	Network Connection Management
NIST	National Institute of Standards and Technology
NIU	Network Interface Unit
NLPS	Network Layer Protocol Standards
NLPSP	Network Layer Protocol Specification
NPDU	Network Packet Data Unit
N(R)	Receive Sequence Number
NRM	Normal Response Mode
N(S)	Send Sequence Number
NSAP	Network Service Access Point
OA	Overall Architecture
OSI	Open Systems Interconnection
OSI CIT	OSI Conformance and Interoperability Test
OSI DS	OSI Directory Service
OSI NM	OSI Network Management
OSI S	OSI Security
OSI P	OSI Priority

OUF	Optional Users Facilities
PAD	Packet Assembler/Disassembler
PDU	Protocol Data Unit
PDN	Public Data Network
PHY	Physical
PICS	Protocol Implementation Conformance Statement
PLSP	Physical Layer Specification
PLPS	Presentation Layer Protocol Standard
PLPSP	Presentation Layer Protocol Specification
PPDU	Presentation Protocol Data Unit
P(R)	Packet Receive Sequence Number
PRL	Profile Requirements List
PRP	Provision for Routing Protocols
PS	Protocol Specification
P(S)	Packet Send Sequence Number
PSN	Packet Switch Network
PSNPDU	Partial Sequence Numbers Protocol Data Unit
PSTN	Packet Switch Telephone Network
PTI	Packet Type Identifier
PUB	Publication
PUS	Provision of the Underlying Service
PVC	Permanent Virtual Circuit
Q-bit	Qualifier bit
REJ	Reject
RI	Ring Indicator
RIB	Routing Information Base
RL	Remote Loopback
ROSE	Remote Operation Service Element

RP	Routing Protocol
RPOA	Registered Private Operating Agency
RR	Receive Ready
RS	Recommended Standard
RS	Resynchronize
RSA	Resynchronize Acknowledge
S-ACTD	S-ACTIVITY-DISCARD
S-ACTE	S-ACTIVITY-END
S-ACTI	S-ACTIVITY-INTERRUPT
S-ACTR	S-ACTIVITY-RESUME
S-ACTS	S-ACTIVITY-START
S-CG	S-CONTROL-GIVE
S-GT-req	S-TOKEN-GIVE request
S-mode	Synchronous Mode
S-PER	S-P-Exemption report
S-REL-req	S-Release- Request
S-REL-rsp	S-Release- Response
S-SYNM	S-Sync-Major
S-UER	S-U-Exemption report
SABM	Set Asynchronous Balanced Mode
SABME	Set Asynchronous Balanced Mode Extended
SIRP	System Inter-Domain Routing Protocol
SLPS	Session Layer Protocol Standard
SLPSP	Session Layer Protocol Specification
SN	Subnetwork
SNCR	Subnetwork Connection Reference
SNDCF	Subnetwork Dependent Convergence Function
SNPA	Subnetwork Point of Attachment
SSO	System and Services Overview

STD	Standard
TIA	Telecommunication Industries Association
TLPS	Transport Layer Protocol Standard
TLPSP	Transport Layer Protocol Specification
TM	Test Mode
TM	Trade Mark
TP	Transaction Processing
TPBA	Token Passing Bus Access
TPDU	Transport Protocol Data Unit
TSAP	Transport Service Access Point
PTD	Presentation Typed Data
UA	Unnumbered Acknowledgment
V	Volts
VC	Virtual Call
VS	Virtual Call Service
VT	Virtual Terminal
VTE	Virtual Terminal Environmental
WAN	Wide Area Network

3.2 NAS Open System Profile. The NAS open systems data communications architecture shall be compliant with the OSI Basic Reference Model shown in Figure 1. The reference model can be divided into two groups of layers; upper layers and lower layers.

The first four OSI layers form the "lower layers" of the ISO/OSI model. These provide the end-to-end services responsible for data transfer. The remaining three OSI layers form the "upper layers" of the ISO/OSI model. These provide the application services responsible for information transfer. The NAS open end systems profile defines the services and protocols selected for use at each layer.

The reference model can be divided into two groups of layers; upper layers and lower layers. Figures 2, 3, and 4 show the protocol architecture to be used for NAS open end system communicating via the Wide Area Networks (WAN) (i.e., the NADIN PSN), Advanced Automation System (AAS) Local Communications Network (LCN), and Local Area Networks (LAN). Figures 5, 6, 7, 8, and 9 show the protocol architecture for NAS routers to be used when enabling communications

between open end system on separate subnetworks. The technical characteristics of each protocol standard and service definition are defined herein. Requirements for NAS open end system connectivity to the Aeronautical Telecommunication Network (ATN) are contained in the International Civil Aviation Organization (ICAO) ATN Manual.

3.2.1 Upper-Layers. Layers 5, 6, and 7 (Session, Presentation, and Application) of the OSI Reference Model are responsible for the protocols necessary to allow two dissimilar systems to understand each other and communicate. This section describes the protocols selected for the implementation of the OSI upper-layers in the NAS.

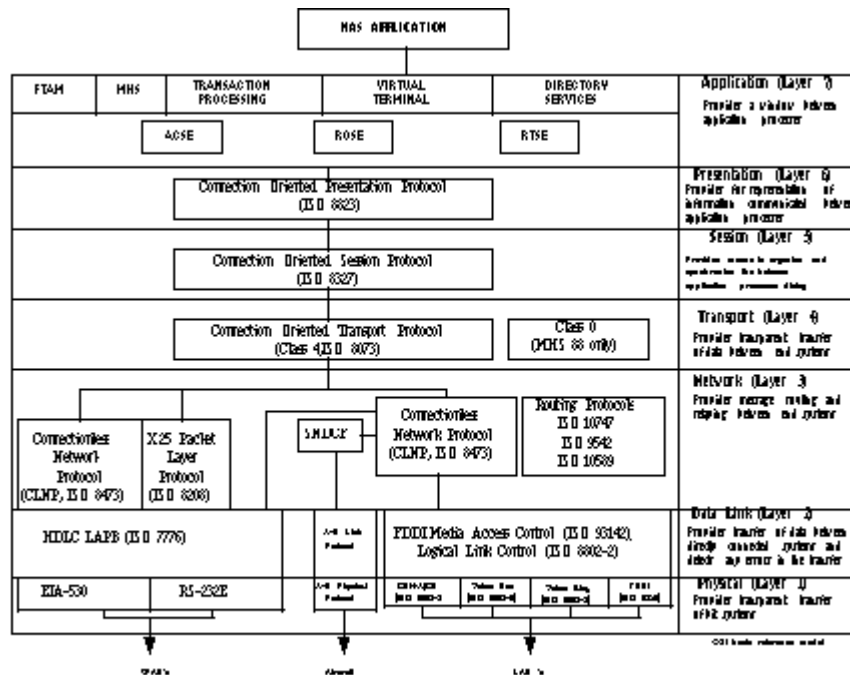


FIGURE 1: NAS Protocols Architecture

Figure 1: NAS Protocols Architecture

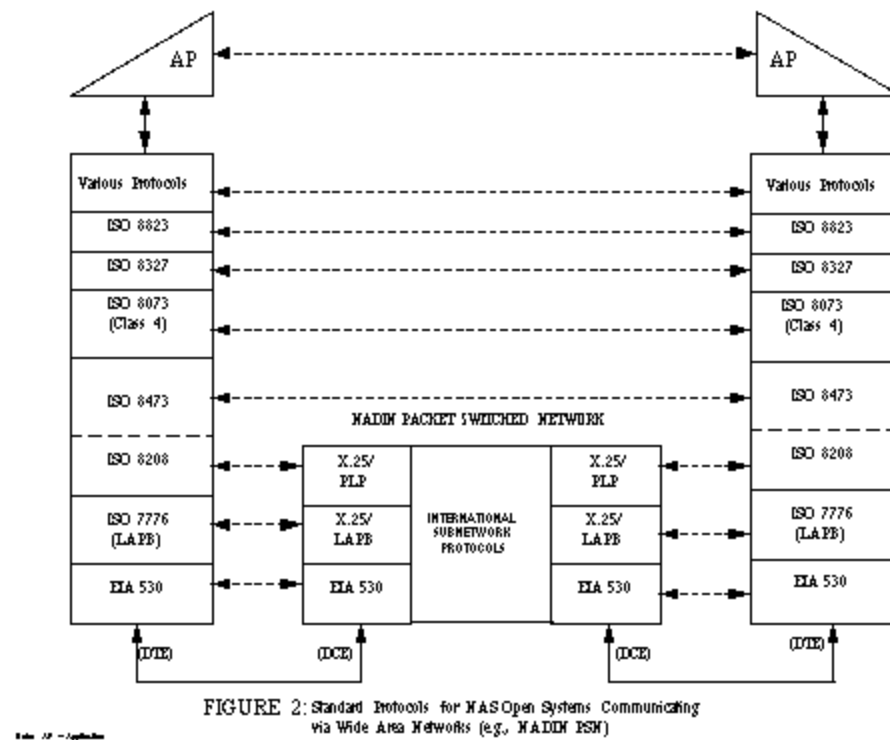


Figure 2: Standard Protocols for NAS Open Systems Communicating via Wide Area Networks (e.g., NADIN PSN)

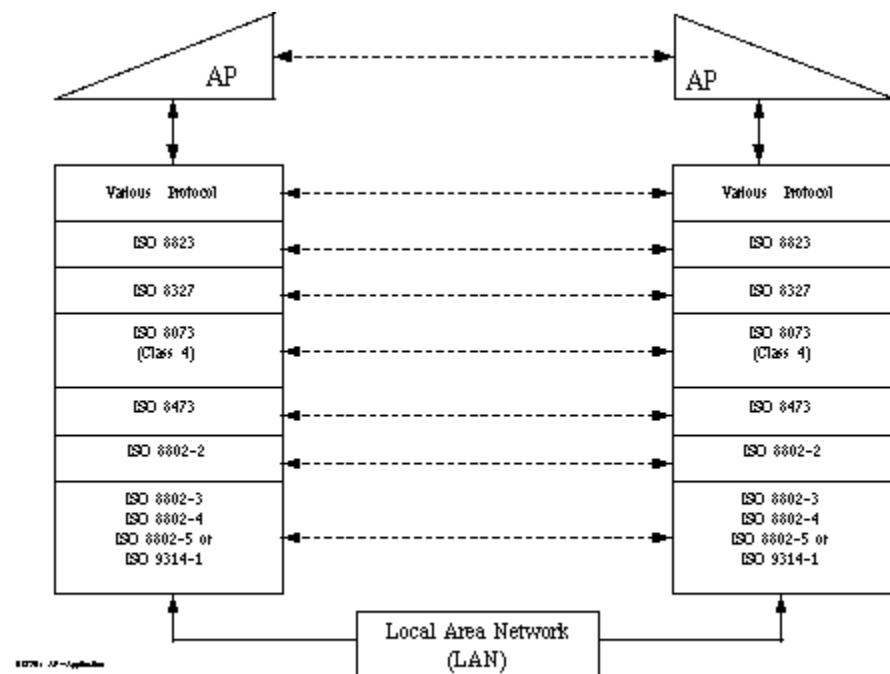


Figure 3: Standard Protocols for NAS Open Systems Communicating via LAN's

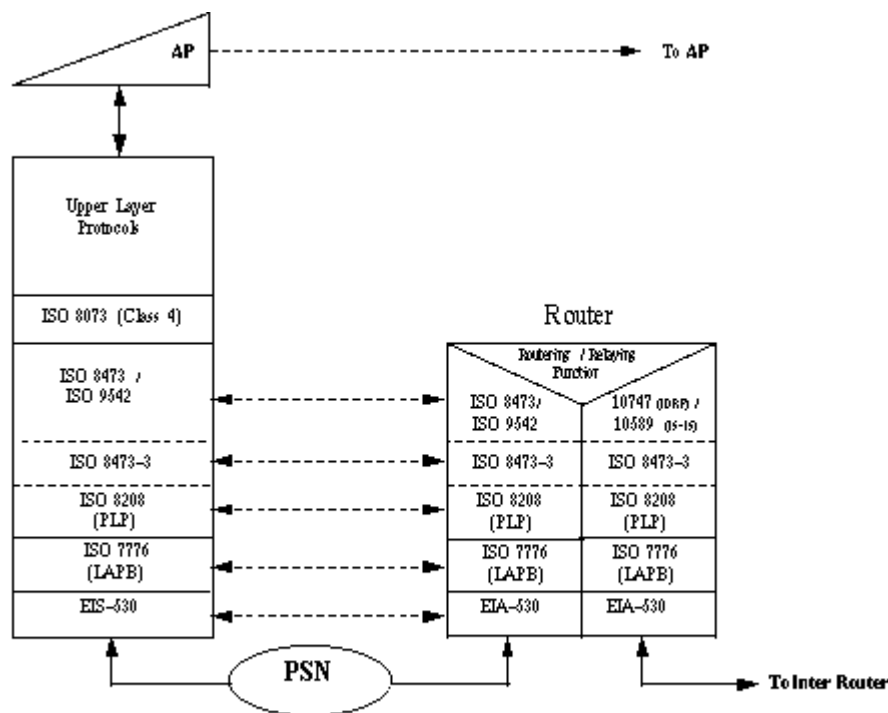


FIGURE 4: Standard Protocols for Communicating Between NAS Open End System and Router via Wide Area Network (e.g., NADIN PSN)

Figure 4: Standard Protocols for Communicating Between NAS open end systems and Router via Wide Area Networks (e.g., NADIN PSN)

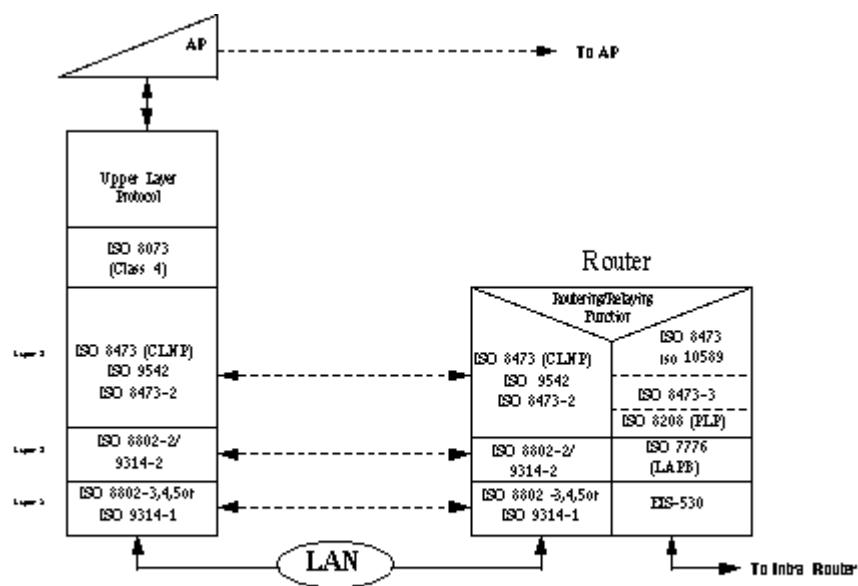


FIGURE 5: Standard Protocol for Communicating Between NAS Open End System and Router via Local Area Network (LAN)

Figure 5: Standard Protocols for Communicating Between NAS open end systems and Router via Local Area Networks (LAN)

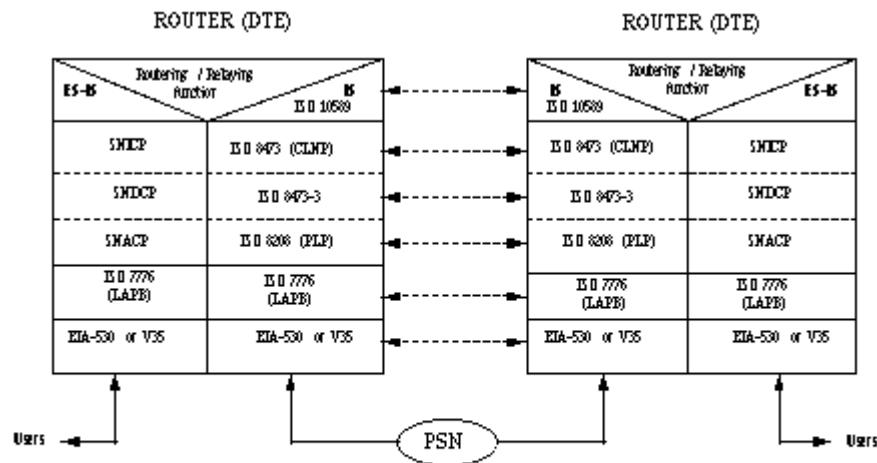


FIGURE 6: Standard Protocols for Communication Between Router / Router (Intra-Domain)

Figure 6: Standard Protocols for Communication Between Router / Router (Intra-Domain)

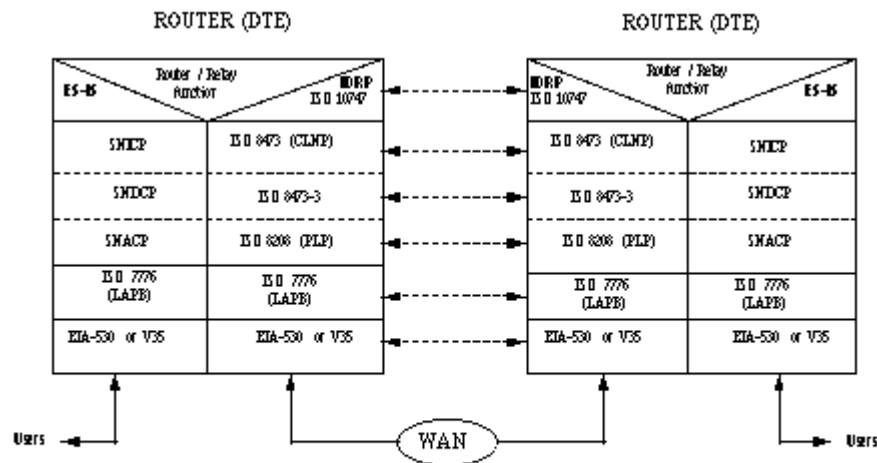


FIGURE 7: Standard Protocol for Communication Between Router / Router (Inter-Domain)

Figure 7: Standard Protocols for Communication Between Router / Router (Inter-Domain)

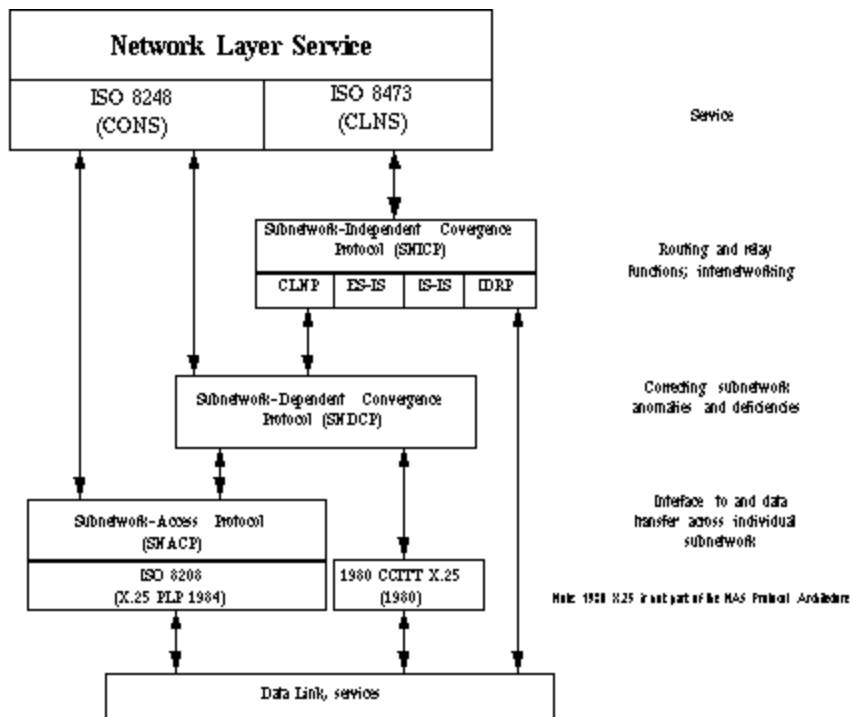


FIGURE 8: Internal Organization of the ISO Network Layer

Figure 8: Internal Organization of the ISO Network Layer

3.2.1.1 Application Layer Protocol Standards (ALPS). This section describes the Application Layer protocols selected for use by NAS open end systems.

3.2.1.1.1 Function of Application Layer Protocols (FALP).. The Application Layer allows for functions and services required by particular user-designed application processes. Functions satisfying particular user requirements are contained in this layer. Representation and transfer of information necessary to communicate between applications are the responsibility of the lower layers. The Application Layer functions are provided by Application Service Elements (ASE). ISO 9545, Application Layer Structure, defines the nature of ASEs, the relationships among them, and the architectural framework in which individual OSI- Compliant Application Layer protocols are developed.

3.2.1.1.2 Application Layer Protocol Specification (ALPSP). NAS open end systems will use common Application Service Elements (ASE) to provide application layer services common to users applications. These ASEs include Association Control Service Element (ACSE) and Remote Operations Service Element (ROSE). NAS open end systems may select from several specific ASEs to satisfy particular open end system requirements. These ASEs include File Transfer, Access, and Management (FTAM), Message Handling System (MHS), Transaction Processing (TP), and Virtual Terminal (VT).

3.2.1.1.2.1 Association Control Service Element (ACSE). All NAS open end systems shall implement the service of ACSE as defined in ISO 8649 and the protocol as defined in ISO 8650 and ISO DIS. 8650-2.

The ACSE has two classes of service: Class 1 and Class 2. Class 1 consists of association control and information transfer facilities for operation in a known context. Class 2 consists of all Class 1 service elements, plus the mandatory service elements of the context management facility. The ACSE facilities are specified as follows:

- (a) The association control facility is provided to initiate, maintain, and release an association between two application entities. It provides service elements to originate a new application association, including defining the application context and initiating a presentation connection.
- (b) The information transfer facility is a set of application service elements that transfer information between associated application entities.
- (c) The context management facility negotiates the sets of service elements to be used during the lifetime of the application association and allows switching between agreed contexts.

NAS open end systems shall implement the association control and information transfer facilities at a minimum. They shall support Class 1 or 2 as required.

3.2.1.1.2.1.1 Profile Requirement List (PRL) for (ACSE). All NAS open end systems implementing ISO DIS 8650-2 shall conform to PRL as defined in Appendix A.

3.2.1.1.2.2 Remote Operations Service Element (ROSE). ROSE, which is used in conjunction with other ASEs, defines the services and notations necessary to

support interactive applications between distributed processing systems. NAS open end system shall implement ROSE in accordance with ISO 9072-1, ISO 9072-2, and the NIST Stable Implementation Agreements for Open Systems Interconnection Protocols.

3.2.1.1.2.3 File Transfer, Access, and Management (FTAM). NAS file transfer

applications between open end systems shall use FTAM. NAS open end system FTAM

implementations shall be in accordance with ISO 8571-1, ISO 8571-2, ISO 8581-3, ISO 8571-4, ISO 8571-5 and the NIST Stable Implementation Agreements for Open Systems Interconnection Protocols.

3.2.1.1.2.3.1 Profile Requirement List (PRL) for (FTAM). All NAS open end systems implementing ISO 8571-5 shall confirm to PRL as defined in Appendix B.

3.2.1.1.2.4 Message Handling System (MHS). NAS electronic mail applications

between open end systems shall use MHS. NAS open end system MHS implementations

shall be in accordance with ISO 10021-1, 10021-2, 10021-3, 10021-4, 10021-5, 10021-6, 10021-7, and the NIST Stable Implementation Agreements for Open Systems

Interconnection Protocols.

3.2.1.1.2.5 Transaction Processing (TP). NAS open end system applications

requiring interactive update of files, in which results are generated

immediately after data entry, shall use TP. NAS open end system TP

implementations shall be in accordance with ISO 10026-1, ISO 10026-2, 10026-3 and the NIST Stable Implementation Agreements for Open Systems Interconnection Protocols.

3.2.1.1.2.6 Virtual Terminal (VT). NAS open end system applications requiring simple line at a time or character at a time dialogue shall use VT. NAS open end system VT implementations shall be in accordance with ISO 9040, ISO 9041-1, and the NIST Stable Implementation Agreements for Open Systems Interconnection Protocols.

3.2.1.2 Presentation Layer Protocol Standards (PLPS). This section describes the Presentation Layer protocols selected for use by NAS open end systems.

3.2.1.2.1 Function of Presentation Layer Protocols (FPLP). The Presentation Layer provides services that determine how all data exchanged by its users (i.e., by application entities) will be represented while in transit across the network. A common meaning is provided through the use of a common transfer syntax between different end-systems. This common syntax is used to represent information including character codes, data types, and file formats.

The Presentation Layer protocol acts as an arbitrator, negotiating a common transfer syntax to be used for the representation of information that the application processes will exchange.

Presentation Layer services include the management of data entry, exchange, display, and representation between application entities. The meaning (semantics) of the data is maintained, while the format and language differences (syntax) are resolved.

The connection-oriented presentation service is defined in ISO 8822. The connection-oriented presentation protocol specification is defined by ISO 8823 and consists of two functional units: kernel and context management.

The kernel is mandatory and is always available for service. It supports the presentation connection and the transfer of data. It also negotiates for the use of one or more transfer syntax'ssyntaxes. Transfer syntax'ssyntaxes may make use of data compression techniques such as run-length encoding.

Context management is an optional service and is negotiable at the time of connection. It allows presentation contexts to be added or deleted during the lifetime of a presentation connection. All new presentation contexts are added to a defined context set.

3.2.1.2.2 Presentation Layer Protocol Specification. (PLPSP). NAS open end systems shall implement the connection-oriented presentation service as defined in ISO 8822 and the connection-oriented presentation protocol as defined in ISO 8823 and ISO DIS 8823-2. At a minimum, NAS open end systems shall implement the presentation kernel. Context management is optional, and shall be used only if needed by particular interfaces.

The Application Layer defines the syntax of messages by using a formal description language called Abstract Syntax Notation One (ASN.1). The abstract syntax used by NAS open end- systems shall be in accordance with ISO 8824 (ASN.1). The transfer syntax'ssyntaxes used by NAS open end systems shall be encoded in accordance with ISO 8825 (Basic Encoding Rules for ASN.1). These rules include coding rules for integers, floating point, octet strings, time data, etc. The minimum transfer syntax shall be OCTET STRING, primitive encoding, with pre-agreed upon syntax. Other transfer syntax'ssyntaxes may be defined at a later date for special purposes.

3.2.1.2.2.1 Profile Requirement List (PRL) for (PLPSP). All NAS open end systems implementing ISO DIS 8823-2 shall confirm to PRL as defined in Appendix C.

3.2.1.2.3 Session Layer Protocol Standards (SLPS). This section describes the Session Layer protocols selected for use by NAS open systems.

3.2.1.2.3.1 Function of Session Layer Protocols (FSLP). The Session Layer allows cooperating application entities to organize and synchronize conversation and to manage data exchange. To transfer data, session connections use transport connections. During a session between application entities, Session Layer services are used to regulate dialogue by ensuring an orderly message exchange on the session connection.

The structured aspects of session dialogue include protocols for turn to talk, for how long to talk, and communications mode (i.e., full duplex or half duplex). Additional functions are establishment of major and minor synchronization points, mapping of names to addresses, reporting of error conditions, and splitting of dialogue into logical activities that are managed on a session basis.

The session service operates in one of three distinct phases:

- (a) Connection Establishment Phase --** Cooperating users are identified and the facilities (tokens) and parameters to be used during the session are negotiated.

- (b) Data Transfer Phase --** Normal and expedited classes of data exchange are provided, supported by token management, session synchronization,

are exception reporting facilities.

- (c) **Connection Release Phase -- Services are provided for orderly release, user-initiated (presentation) abort, and provider (session) abort. The latter two cases may result in the loss of some protocol data units.**

3.2.1.2.3.2 Session Layer Protocol Specification (SLPSP). NAS open end systems shall implement the connection-oriented session service as defined in ISO 8326 and the connection-oriented session protocol specification as defined in ISO 8327. The Session Version 2 (Unlimited User Data) shall be supported in accordance with ISO 8326/DAD2 and ISO 8327/DAD2. The session protocol consists of a kernel, and 11 other functional units. These functional units may be used in various combinations, depending on the required functions. The set of functional units to be implemented is determined by the requirements of the Application Layer protocol. At a minimum, NAS open end systems shall implement the kernel and full-duplex functional units. Certain applications may require the implementation of additional functional units.

3.2.2 Lower-layers (LL). Layers 1, 2, and 3 of the OSI Reference Model (Physical, Data Link, and Network) are responsible for the data communication protocols used to interface the data communications network with the communicating NAS end-system processors. Layer 4 of the OSI Reference Model (Transport Layer), isolates the upper-layers from the detailed workings of the lower-layers. This section describes the protocols selected for NAS open end

system implementation of the OSI lower-layers.

3.2.2.1 Transport Layer Protocol Standards (TLPS). This section describes the Transport Layer protocols selected for use by NAS open end systems.

3.2.2.1.1 Function of Transport Layer Protocols (FTLP). The Transport Layer provides reliable, transparent transfer of data between cooperating session entities. The Transport Layer entities optimize the available network services to provide the performance required by each session entity. Optimization is constrained by the overall demands of concurrent session entities and by the quality and capacity of the network services available to the Transport Layer entities. Transport protocols regulate flow, detect and correct errors, and multiplex data, on an end-to-end basis.

To provide a basis for deciding which Transport Layer protocol should be used, three types of Network Layer connections have been defined regarding error rates in relation to user requirements. Type A network connections have an acceptable residual (unsigned) error rate and an acceptable signaled error rate. Type B network connections have an acceptable residual (unsigned) error rate and an unacceptable signaled error rate. Type C network connections have an unacceptable residual (unsigned) error rate. An important point is that acceptability is determined relative to the needs of the applications, rather than being an absolute measure.

3.2.2.1.2 Transport Layer Protocol Specification (TLPSP). There are two types of Transport Layer services: Connection-Oriented and Connectionless. NAS open end systems shall implement the Connection-Oriented Transport Service (COTS).

3.2.2.1.2.1 Connection-Oriented Transport Service (COTS). NAS open end systems shall implement the connection oriented transport service as defined in ISO 8072 and the protocol as defined in ISO 8073 and ISO 8073/AD2. The connection-oriented protocol is divided into five classes (0 through 4):

- (a) Class 0 - Simple Class -- This class is designed to be used with Type A network connections. It is the simplest type of transport connection. It provides neither error recovery nor multiplexing (e.g., systems with a requirement for X.400 mail systems shall support Class 0).**

- (b) Class 1- Basic Error Recovery Class -- This class is designed to be used with Type B network connections. It provides a basic transport connection with minimal overhead. Recovery from network disconnect or reset is included.**

- (c) Class 2 - Multiplexing Class -- This class is designed to be used with Type A network connections. It multiplexes several transport connections onto a single network connection. There is no error detection or recovery procedure. The transport connection is terminated when an error is signaled from the Network Layer.**

- (d) Class 3 - Error Recovery and Multiplexing Class -- This class is designed to be used with Type B network connections. It provides the multiplexing capabilities of Class 2 with the error recovery capabilities of Class 1.**

(e) Class 4 - Error Detection and Recovery Class -- This class is designed to be used with Type C network connections. It provides the characteristics of Class 3, and the capability to detect and recover from lost, duplicated, or out-of-sequence transport protocol data units (TPDU). It also provides the optional detection of damaged TPDU's by use of a checksum. It allows for increased throughput by permitting a transport connection to use multiple network connections.

NAS open end systems shall implement ISO 8073 and ISO IEC 8073: Am3, Class 4, and shall comply with the transport procedures stated in the Stable Implementation Agreements for OSI protocols.

3.2.2.1.2.1.1 Profile Requirement List (PRL) for (COTS). All NAS open end systems implementing ISO IEC 8073 :Am3 shall confirm to PRL as defined in Appendix D.

3.2.2.1.2.2 Connectionless Transport Service (CLTS). Although ISO has defined a connectionless (datagram) transport protocol (ISO 8602), there are currently no NAS open end systems requirements specified for its use.

3.2.2.2 Network Layer Protocol Standards (NLPS). This section describes the Network Layer protocols selected for use by NAS open systems.

3.2.2.2.1 Function of Network Layer Protocols (FNLP). The Network Layer provides functions for the relaying and routing of information between OSI users on end-systems which may or may not be connected by intermediate systems. End-systems and intermediate systems provide the same Network Layer functions, with

the exception of relaying functions which are performed by intermediate systems only. The Network Layer provides hop-by-hop network service enhancements, flow control, and load leveling. Services provided by this layer are independent of the distance separating interconnected networks. The Network Layer Internal Organization of the Network Layer shall be structured in accordance with ISO 8648, Internal Organization of the Network Layer.

Network Layer Organization: The Network Layer provides the network service where many protocols reside, each performing a specific network function that assists in routing the user data to the ES. The network service provides service to the Transport Layer. Because of the complexity of these network functions ISO deemed it necessary to develop a framework for organizing the various protocols that reside in the Network Layer. This framework is referred to as the Internal Organization of the Network Layer (IONL) and is defined in ISO 8648. (OSI Fig. 8 Show Internal Organization of the Network Layer).

The IONL defines three roles for Network Layer Protocols. The following Protocols may be used to construct the OSI Network Services.

- Subnetwork Access Protocol (SNAP)
- Subnetwork Dependent Convergence Protocol (SNDP)
- Subnetwork Independent Convergence Protocol (SNICP)

A SNAP provides communication between a network entity in the subnetwork and

a network entity in a network ES. An example of SNAcP is X.25 PLP or LAN such as

a Token Ring network.

A SNDCP operates over the SNAcP. It provides a service mapping between a specific SNAcF and a SNICP in absence of a direct interface. A SNDCP improves the SNAcP service. It also manipulates the subnetwork service to relax the provisions of the underlying capabilities required by an SNICP. For example, the 1980 version of the X.25 PLP provides a SNAcP.

A X.25 1984 SNDCP has been defined that operates over the 1980 X.25 SNAcP to increase the quality of the network service for X.25 1984 functionality. ISO 8473 specifies SNDCP, which provides the interface between Connectionless Network Protocol (CLNP) to X.25 Packet Level Protocol (PLP)/ISO 8208 sub networks or the interface between CLNP and ISO 8802-2 LAN subnetwork. ISO 8473

also specifies the interface between CLNP and ISO 7776 Link Access Procedure Balanced (LAPB) or CCITT Q.921 Link Access Procedures on the D-channel (LAPD) protocol.

A SNICP provides the OSI Network Service over a set of underlying capabilities that is independent of characteristics of any specific sub network service. It provides connection- mode or connectionless-mode service to network service users. For example, LAN, based subnetworks are inherently Connectionless in operation but packet switch networks are typical connection oriented. When connecting these two types of networks a convergence protocol is required that hides the different modes of operation from the end users. The CLNP (ISO 8473)

provides. The ES to IS routing protocols also reside in this sub layer as they operate independently of the underlying SNACP.

3.2.2.2.2 Network Layer Protocol Specification (NLPSP). NAS open systems shall support the Connectionless-Mode Network Service (CLNS) and the Connection-Oriented Network Service (CONS) as defined in ISO 8348, ISO 8348/AD1,

and ISO 8473. NAS open end systems communicating over packet switching networks

(e.g., NADIN PSN) shall implement ISO 8208 as the subnetworksubnetwork access protocol whether implementing CLNS or CONS. ISO 8208 will provide for direct layer 3 connections between open end systems (DTE to DTE) as well as connections through an intermediate system such as a packet switching network (DTE to DCE) Intermediate systems shall implement CCITT X.25 (1984) provided they correctly interface to end-systems implementing ISO 8208.

3.2.2.2.2.1 Connectionless-Mode Network Service (CLNS). The CLNS provides the Transport Layer with a Connectionless Network Service where network connections between end-systems are not established. Information is transferred via individual data unit transfers which are independent of previous transfer requests. All NAS open end systems and intermediate systems shall implement ISO 8348/AD1, Network Service Definition, Addendum 1: Connectionless Mode Transmission.

3.2.2.2.2.1.1 Connectionless Network Protocol Functions (CLNPF). All NAS open end systems shall implement ISO 8473, Protocol for Providing the Connectionless-Mode Network Service. A subset of the Full Protocol (see Table 4

of ISO 8473) shall be supported utilizing the following protocol functions: (See Clauses 6.1 through 6.18 and Table 4 of ISO 8473 and ISO 8473-1 for a description of the functions)

(a) Type 1 functions: All Type 1 functions are mandatory under the standard.

(b) Type 2 functions: Type 2 functions are optional.

(c) Type 3 functions: The following Type 3 functions shall be supported:

(1) Priority

(2) Quality of Service

3.2.2.2.2.1.1.1 Profile Requirement List (PRL) for (CLNPF). All NAS open end systems implementing ISO-8473-1 shall confirm to PRL as defined in the Appendix E .

3.2.2.2.2.1.1.2 Provision of the Underlying Service (PUS). NAS open end systems shall provide the sub networksubnetwork dependent convergence function as specified in ISO 8473 and 8473-2- clause 8.5.2. The convergence function will map the Connectionless services of the Network Layer to the services provided by the X.25 connection-oriented network access protocol. ISO 8473/AD3 shall be implemented for open end systems providing ISO 8473 over an OSI data link service.

3.2.2.2.2.1.2.1 Profile Requirement List (PRL) for (PUS). All NAS open end system implementing ISO 8473-2 shall confirm to PRL as defined in Appendix F.

3.2.2.2.2.1.3 Provision for Routing Protocols (PRP). NAS open end systems, requiring communications via routers, shall implement the End System (ES) to Intermediate System (IS) Routing Protocol in conjunction with ISO 8473. NAS intermediate systems providing NAS routing shall implement shall implement the IS to IS Intra-Domain Routing Protocol. ISO 10589 and ISO 10747. NAS intermediate systems providing routing to external networks shall use the Boundary Intermediate System (BIS) Inter-Domain Routing Protocol.

3.2.2.2.2.1.3.1 End System to Intermediate System Routing Protocol (ES-ISRPl. NAS open end systems, that require communication through routers, shall use the ES-IS routing protocol to enable routing service. The ES-IS protocol shall be in accordance with ISO 9542 and the Open Systems Environment Implementors' Workshop OIW Stable Agreement for Open Systems Interconnection

Protocols and shall be used in conjunction with ISO 8473.

3.2.2.2.2.1.3.1.1 Profile Requirement List (PRL) for (ES-ISRPl. All NAS open end systems implementing ISO 9542 shall confirm to PRL as defined in Appendix G.

3.2.2.2.2.1.3.2 Intermediate System to Intermediate System (IS-IS) Intra-Domain Routing Protocol. NAS open intermediate systems, providing NAS routing, shall use the IS-IS intra-domain routing protocol to enable routing within the NAS routing domain. The IS-IS protocol shall be in accordance with

ISO 10589 , ISO IEC 10589 and the NIST Stable Agreement for Open Systems

Interconnection Protocols. and shall be used in conjunction with ISO 8473.

Intra-domain routing between the NAS and the ATN shall be in accordance with the ATN Manual.

3.2.2.2.2.1.3.2.1 Profile Requirement List for (IS-IS). All NAS open end systems implementing ISO IEC 10589 shall confirm in Appendix H.

3.2.2.2.2.1.3.3 Boundary Intermediate System to Boundary Intermediate System (BIS-BIS) Inter-Domain Routing Protocol (IDRP). NAS open boundary intermediate

systems, providing routing, shall use the BIS-BIS inter-domain routing protocol to enable routing between the NAS routing domain and an external routing domain (e.g., ATN routing domain). The BIS-BIS protocol shall be in accordance with ISO 10747, ISO IEC 10747 and the NIST Stable Agreement for Open Systems Interconnection Protocols and shall be used in conjunction with ISO 8473.

Inter-domain routing between the NAS and the ATN shall be in accordance with the ATN Manual.

3.2.2.2.2.1.3.3.1 Profile Requirement List PRL for (BIS-BIS IDRP). All NAS open end systems implementing ISO IEC 10747 shall confirm to PRL as defined in Appendix I.

3.2.2.2.2.2 Connection-Oriented Network Service (CONS). The CONS provides the Transport Layer with a network connection service where network connections between end-systems are to be established. CONS shall be implemented in accordance with ISO 8880-1 and ISO 8880-2. CONS may be used over a specific interface provided there are either no intermediary networks or only X.25

intermediary networks. For NAS open end systems communicating over X.25 wide area networks, CONS shall be provided as defined in ISO 8878, Use of X.25 to Provide OSI Connection-mode Network Service.

3.2.2.2.2.1 Optional User Facilities (for X.25 sub networks) (OUF X.25).

X.25 supports a wide variety of features and options called facilities. The following optional user facilities shall be supported by the X.25 sub network (e.g., NADIN PSN) in accordance with CCITT X.25 (1984). The X.25 sub network shall provide the facility if requested by the end-system.

- (a) On-line facility registration;**
- (b) Extended packet sequence numbering;**
- (c) Nonstandard default window sizes;**
- (d) Default throughout classes assignment;**
- (e) Incoming calls barred;**
- (f) Outgoing calls barred;**
- (g) One-way logical channel incoming;**
- (h) One-way logical channel outgoing;**

- (i) Closed user group;**
- (j) Closed user group with outgoing access;**
- (k) Closed user group with incoming access;**
- (l) Reverse charging acceptance;**
- (m) Nonstandard default packet sizes;**
- (n) Flow control parameter negotiation;**
- (o) Throughput class negotiation;**
- (p) Past select acceptance;**
- (q) D-bit modification;**
- (r) Call redirection;**
- (s) Hunt group.**

The following optional facilities shall be provided by the X.25 subnetwork when requested by the end-system on a per-call basis:

- (a) Fast select;**
- (b) Closed user group selection;**
- (c) Reverse charging;**
- (d) Registered Private Operating Agency (RPOA);**
- (e) Flow control parameter negotiation;**
- (f) Throughput class negotiation;**
- (g) Called line address modified notification;**
- (h) Call redirection notification;**
- (i) Network user identification.**

In addition, the X.25 sub networksubnetwork shall support CCITT-specified DTE facilities as described in Annex G of the X.25 Recommendation.

3.2.2.2.2.2 Optional User Facilities (OUF) (for ISO 8208 systems). NAS open end systems implementing the CONS shall support the following optional user facilities in accordance with Clause 5.1 ISO 8878:

- (a) Fast select;**
- (b) Fast select acceptance;**
- (c) Throughput class negotiation;**
- (d) Transit delay selection and indication;**
- (e) Called address extension;**
- (f) Calling address extension;**
- (g) End-to-end transit delay negotiation;**
- (h) Expedited data negotiation;**
- (i) Minimum throughput class negotiation.**

This standard does not require or prohibit use of other X.25 facilities by NAS open end systems. The facilities used will vary among different interfaces.

3.2.2.2.2.2.1 Profile Requirement List for (OUF). All NAS open end systems implementing OUF ISO 8208 shall confirm to PRL as defined in Appendix J.

3.2.2.3 Data Link Layer Protocol Standards. This section describes the Data Link Layer protocols selected for use by NAS open systems.

3.2.2.3.1 Function of Data Link Layer Protocols (FDLP). The Data Link Layer provides services related to the reliable interchange of data without loss across a physical link between adjacent systems. Data link protocols manage the logical establishment, maintenance, and release of data link connections. In addition, these protocols control the synchronization and flow of data, and supervise error recovery. The Data Link Layer functions are provided as services to the Network Layer. In bit-oriented protocols, the detection of transmission errors is typically accomplished through a cyclic redundancy check (CRC) algorithm. The data stream is broken down into the basic transmission units (data frames). The Data Link Layer protocols may provide mechanisms to handle lost, damaged, or duplicate data frames, acknowledgment of receipt of current data frames, line turn-around, and basic flow control.

3.2.2.3.2 Data Link Layer Protocol Specification (DLPS). The Data Link Layer protocol standards implemented by NAS open systems shall be ISO 4335, ISO 7478, ISO 7776, CCITT X.32, and ISO 8802-2.

3.2.2.3.2.1 High-level Data Link Control (HDLC) ISO 4335. NAS open systems shall implement the Data Link Layer service as defined in ISO Draft International Standard (DIS) 8886 and the protocol as defined in ISO 4335 (HDLC). ISO standards 3309 (HDLC frame structure) and 7809 (HDLC consolidation

classes of procedure) are also applicable.

The options recommended for use by NAS open systems are described below:

(a) **Option 2 - Reject** -- This option is required by ISO 7776 [Link Access Procedure Balanced (LAPB)] and permits the prompt initiation of the recovery process for missing information frames (I-frame) by providing for a negative acknowledgment (reject).

(b) **Option 3 - Selective Reject** -- This option allows requesting re-transmission of a single I-frame and recovers I-frame sequence errors. It may improve efficiency on links with long transmission delay (e.g., satellite links or systems using module 128).

(c) **Option 4 - Unnumbered Information Frames** -- This option provides ability to exchange information without impacting the send and receive variables. This option allows datagram transmission (i.e., transmission with no acknowledgment of receipt).

(d) **Option 7 - Multiple Octet Addressing** -- This option allows the use of one or more address octets. It allows multiple octet addresses and therefore allows more address combinations. Note that multiple octet addresses are not required.

(e) **Option 8 - I-Frames Transmitted Only as Commands** -- This option is required by ISO 7776 (LAPB) and is required to achieve greater compatibility, particularly for NADIN PSN interfaces (which must

comply with this for proper operation).

(f) Option 10 - Extended Sequence Numbering -- This option allows sequence numbers to be extended from module 8 to module 128. This option can improve efficiency on links with long transmission delay (e.g., satellite links), especially if used in conjunction with option 3.

(g) Option 12 - Data Link Test -- This option enable performance of Data Link Layer loopback tests. The HDLC normal response mode (NRM) shall be used in cases where multi-drop or polling systems are used and the use of the standard seven layer protocol architecture is inappropriate or special options are required.

3.2.2.3.2.1.1 CCITT X.25 LAPB. The standard NAS open systems implementation for X.25 intermediate systems shall be balanced asynchronous [Class Balanced Asynchronous (BA)] with options 2 and 8. Class BA with options 2, 8, and 10 is recognized as an optional, subscription-time selectable, extended sequence numbering service that may be available to serve DTE applications having a need for module 128 sequence numbering.

3.2.2.3.2.1.2 ISO 7776. ISO 7776 shall be used by X.25 DTEs to insure a compatible LAPB interface to the DCE.

3.2.2.3.2.1.2.1 Profile Requirement List for ISO 7776. All NAS open end systems implementing ISO 7776 shall confirm to PRL as defined in Appendix K.

3.2.2.3.2.2 ISO 7478 (Multilink Procedure). NAS open end systems required to transfer data over multiple parallel physical connections to achieve a reliable, available, and variable bandwidth between the DTE/DCE interface shall implement the multilink procedure (MLP) in accordance with ISO 7478. The MLP function resides as an upper sub-layer of the Data Link Layer. It operates between the multiple single data link protocol functions and the Network Layer. X.25 users shall implement MLP as a subscription time option as described in section 2.5 (LAPB) of CCITT Recommendation X.25, 1984 version. The implementation of MLP in

the NAS shall facilitate the mitigation of a critical path failure without the interruption of services and shall:

- (a) Achieve economy and reliability of service by providing multiple physical connections; between the DTE and DCE interface;**
- (b) Permit addition and deletion of single physical connections without interrupting the services provided by the multiple connections;**
- (c) Optimize bandwidth use of a group of connections through load sharing;**
- (d) Achieve graceful degradation of service when a single connection or multiple connections fail;**
- (e) Provide each group with the appearance of a single logical data**

link to the Network Layer;

(f) Provide, when required, resequencing of the received data units before to delivery to the Network Layer;

(g) Minimize the impact that multilink operation may have on the Network Layer protocols and existing data links;

(h) Maximize the applicability of the procedure to a variety of link control protocols, line speeds, and configurations.

The MLP link control functions, link layer addressing, frame structure, and link parameters shall be implemented in accordance with ISO 7478 [CCITT X.25 (1984) for X.25 users].

3.2.2.3.2.3 CCITT X.32. Dial-in/dial-out services and procedures shall be implemented in accordance with CCITT X.32 when the packet switching network uses a public telephone network as its backbone.

3.2.2.3.2.4 ISO 8802-2. NAS open systems shall implement ISO 8802-2 as the standard for logical link control (LLC) in conjunction with ISO 8802-3, for Conformance Requirement 8802-4, for Editorial Changes and Technical corrections or ISO 8802-5 for Bridged LAN Source Routing Operation by End System. Either Connectionless or connection-oriented operations shall may be supported.

3.2.2.3.2.4.1 Profile Requirement List (PRL) for ISO 8802-2. All NAS open end

system implementing ISO 8802-2 shall conform to PRL as defined in Appendix F .

3.2.2.4 Physical Layer Protocol Standards. . *This section describes*

the Physical Layer protocol standards selected for use by NAS open end systems.

3.2.2.4.1 Function of Physical Layer Protocol Standards. *As the lowest layer*

in the OSI Reference Model, the Physical Layer interface provides services to

the next higher layer, the Data Link Layer. It is responsible for establishing

the physical connection and interface to the transmission medium [e.g., Data

Terminal Equipment (DTE)/Data Circuit-Terminating Equipment (DCE) interface].

The characteristics of this layer are independent of the physical media, which

could be coaxial cable, twisted copper wire, fiber optic cable, and many other

cable types. The Physical Layer interface is concerned primarily with the

following physical interface characteristics:

(a) Mechanical: This characteristic defines the physical attributes of the connector (i.e., the number of pins, shape, and dimensions of the connecting block).

(b) Electrical: This characteristic specifies whether the connection is balanced or unbalanced and what voltages are to be used.

(c) Functional: This characteristic defines which electrical circuit performs control, timing, and grounding.

3.2.2.4.2 Physical Layer Protocol Specification. *NAS open systems shall*

implement one of the following standards at the physical layer interface:

EIA-530, EIA-232E, RS-232C, V.35, V.32, ISO 8802-X, AND ISO 9314 (FDDI). or FAA-STD-049 for fiber optic.

3.2.2.4.2.1 EIA-530. EIA-530 shall be the primary Physical Layer interface standard implemented by new systems. EIA-530 has the following interface characteristics:

- (a) Data rate: Lines speeds between 0 to 2 Mbps are supported in accordance with FIPS PUB 154.*
- (b) Cable length: Cable lengths up to 200 feet (maximum) are supported for high-speed lines. Cable lengths up to 4000 feet (maximum) are supported for low-speed lines (0 to 20 kbps).*
- (c) Mechanical: D-shaped, 25-pin interface connector is specified for all interchange circuits in accordance with ISO 2110. The DTE requires male (pin) contacts and a female shell (plug connector); the DCE requires a female contacts and a male shell.*
- (d) Electrical: The maximum voltage is +/- 6V. The balanced electrical characteristics are defined in RS-422A and FED-STD-1020A (EIA-530, Category I). The unbalanced electrical characteristics are defined in RS-423A and FED-STD-1030A (EIA-530, Category II).*
- (e) Functional: EIA-530 interchange circuits fall into four general classifications: ground (or common return), data circuits, control*

circuits, and timing circuits. A functional description of the interchange circuits, pin assignments, and selected communication system configurations are specified in EIA-530 and FIPS PUB 154.

The additional functions [local loopback (LL), remote loopback (RL), and test mode (TM)] shall assist users in tracking down a defective unit and fault isolation between DTE/DCE. EIA-530 will not interoperate with equipment using RS-232 electrical characteristics. EIA-530 does not support secondary signals and dial-up applications.

3.2.2.4.2.2 EIA-232E. EIA-232E shall be used by NAS interfaces that are required to implement dial-up applications and secondary signals. This standard is a revision of RS-232C and EIA-232D. This revision updates the standard to conform to CCITT V.24 (modem connection to the telephone network), V.28, and ISO 2110. It also includes the specification for a 25-pin interface connector and adds LL, RL, and TM interchange circuits. A shield has been added, the protective ground has been redefined, and some terminology has been changed. EIA-232E is compatible with the electrical characteristics of EIA-232D but not with EIA-530. EIA-232E is compatible with the electrical characteristics of EPA-232C but has additional functionality. EPA-232E has the following interface characteristics:

(a) Data rate: Low-speed lines up to 20 Kbps are supported.

(b) Cable length: Cable lengths up to 50 feet (maximum) are supported for

low-speed lines. When more than 50 feet of cable is required, a low capacitance, shielded cable is recommended in accordance with EPA-232E.

(c) Mechanical: D-shaped, 25-pin interface connector is specified for all interchange circuits in accordance with ISO 2110.

(d) Electrical: The operating voltage range is +/- 3V to +/- 25V, unbalanced. Unbalanced circuits (each circuit uses only one pin and a common ground return) are defined in the EPA-232D standard. Electrical signal characteristics are defined in CHIT V.28 and the EPA-232D standard.

(e) Functional: Synchronous/asynchronous and full/half duplex communications are supported via the interchange circuits and pin assignments as defined in V.24 and the EPA-232D standard.

3.2.2.4.2.3 RS-232C. RS-232C shall be supported for interfacing with existing NAS interfaces. RS-232C is a part of CHIT recommendation X.21 and is used for low-speed data communications.

(a) Data rate: Low-speed lines of 20 Kbps or less are supported.

(b) Cable length: Cable lengths up to 50 feet (maximum) are supported.

(c) Mechanical: The 25-pin connector is defined in an appendix of the RS-232C standard.

(d) Electrical: Unbalanced circuits (each circuit uses only one pin and a common ground return) are defined in the RS-232C standard. Electrical signal characteristics are defined in the RS-232C standard.

(e) Functional: Synchronous/asynchronous and full/half duplex communications are supported via the interchange circuits and pin assignments as defined in the RS-232C standard.

3.2.2.4.2.4 V.35. V.35 is a CCITT recommendation for data transmission on wide band group channels. This standard shall be used by NAS open end systems to meet the following Physical Layer interface requirements:

(a) Data rate: Line speeds up to 64 Kbps are supported.

(b) Cable length: Cable lengths up to 50 feet (maximum) are supported.

(c) Mechanical: A 34-pin connector is defined in ISO 2593.

(d) Electrical: A combination of unbalanced voltage and balanced current is supported. Data and clock circuits are driven by balanced generators. These are not compatible with RS-422A circuits. Control signals are

unbalanced and compatible with the RS-232C standard.

(e) Functional: The functional interface circuits are identical to the circuits defined in the RS-232C standard.

3.2.2.4.2.5 V.32. V.32 is a CCITT recommendation for full duplex, low speed transmission over dial-up lines. The V.32 modem provides for leased and dial line communication. It also provides synchronous, asynchronous, and auto dialing modes. This standard shall be used by NAS open end systems to meet the following Physical Layer interface requirements:

(a) Data rate: Line speeds up to 9.6 Kbps are supported.

(b) Mechanical: A terminal interface (25 pin) is supported. The mechanical characteristics of EPA-232D and CHIT V.24/V.28 are supported.

A line interface (modular jack or terminal) is supported.

3.2.2.4.2.6 ISO 8802-x and ISO 9314-1. IEEE has approved several interface standards for the Physical Layer for operation in the 1 to 16 Mbps range. ISO has also adopted the IEEE LAN standards for use in OSI compliant networks. NAS open end systems shall implement ISO 8802-2 and ISO 8802-3 which have been adopted as FIPS PUB 107 for federal LAN implementations when required to use a collision detection access protocol. ISO 8802-3 is similar, but not compatible with Ethernet. NAS open end systems shall implement ISO 8802-4 when

required to use a token passing protocol suitable for broad band bus architectures. It has four levels of priority and can operate at 1, 5, 10, or 16 MBAs.

NAS open end systems shall implement ISO 8802-5 when required to use a token passing protocol suitable for ring architectures. It has eight levels of priority and can operate at 1, 4, or 16 MBAs. NAS open end systems shall implement ISO 9314-1 fiber optic ring LAN standard operating at 100 MBAs, when required to use a Connectionless token passing protocol. This standard is titled FiberFibre Distributed Data Interface (FDDI). Additional characteristics for a fiber optic interface shall be obtained in FAA-STD-049.

3.3 Naming and Addressing . Naming and addressing requirements for NAS open systems (i.e., intermediate and end-systems) shall be in accordance with FAA-STD-042. Naming and addressing requirements for Aeronautical Telecommunication Network (ATN) open systems shall be in accordance with the ATN Manual.

3.4 OSI Directory Services . NAS open end systems that use directories shall implement OSI Directory Services as specified in FAA-STD-044.

3.5 OSI Network Management. Work to establish U.S. Government and international standards on network management is underway; however, general implementation of the international work has not yet been accomplished. As an interim measure, the U.S. Government may adopt an industry standard for network management. Network Management requirements shall conform to ISO 7498-4.

3.6 OSI Security. The OSI security model has recently been approved as

an international standard (ISO 7498-2), but no actual mechanisms have been agreed upon to implement the security model. The OSI security work is not sufficiently advanced at this time for this standard to levy NAS-wide security requirements mechanisms and protocols implemented in the NAS shall be in accordance with FAA-STD-045 (ISO) application only).

3.7 OSI Priority. NAS open end systems that require the transmission of prioritized data shall use the priority indicators as specified in FAA-STD-043. NAS open end systems that communicate with the ATN shall use the priority indicators specified in the ATN manual.

3.8 Compliance with the ATN PRL.

See the ICAO ATN manual.

3.9 OSI Conformance and Interoperability Test. NAS open system shall conform to FAA-STD-047 for conformance and FAA-STD-048 for interoperability testing.

4. QUALITY ASSURANCE PROVISION

This section is not applicable to this standard.

5. PREPARATION FOR DELIVERY

This section is not applicable to this standard

6. NOTES

6.1 Definitions. The terms defined below are frequently used

throughout this document. They are defined here to assist in the understanding of the information presented herein.

Protocol - In the Open System Interconnection reference model, the communications functions are partitioned into seven layers. Each layer, N, provides a service to the layer above N+1, by carrying on a conversation with the layer N on another processor. The rules and conventions of that N-layer conversation are called the pProtocol.

End-system - An end-system contains the application processes that are the ultimate sources and destinations of user-oriented message flows. The functions of an end-system can be distributed among more than one processor/computer.

Intermediate System - A system providing an OSI reference model network layer relay function (that is, a system that receives data from one corresponding Network entity and forwards it to another corresponding Network entity).

Open System - An open system is a system capable of communicating with other open systems by virtue of implementing OSI protocols and services. End-systems and intermediate systems are open systems. However, an open system may not be accessible by all other open systems. This isolation may be provided by physical separation or by technical capabilities based upon computer and communications security.

OSI Environment - Is concerned with the exchange of information between open systems (and not the internal functioning of each individual real open system).

OSI is concerned only with interconnection of systems. All other aspects of systems which are not related to interconnection are outside the scope of OSI.

NAS - National Airspace System is the common network of U.S. airspace; air navigation facilities, equipment, and services; airports or landing areas; aeronautical charts, information's and services; rules, regulations and procedures, technical information, manpower, and material. Included are system components shared jointly with the military.

NADIN-PSN - Packet switching Network System where messages are broken down into smaller packets which are then individually addressed and routed over the network for data interchange.

Profile- A profile is defined as the set of one or more OSI base specifications and the identifications of the chosen classes, common subsets, options, and parameters of those to facilitate interworking between systems implementing the same set of base specifications.

PRL- Profile Requirement List is provided for each profile and captures:

- a. The general options of the profile as a whole;*
- b. A list of the specifications selected and combined in the profile; and references to the related PICS proforma's.*
- c. For each of these referenced base specifications, an expression of the restrictions upon how the questions in the corresponding PICS proforma may be included. This section of the PRL is derived from the PICS proforma's of the relevant se specifications, indicating the restrictions necessary to express the profile requirements.*

Protocol- A protocol is any specific procedure in which precise rules of format and communications are followed. It is defined in communication hardware and software to describe the particular transmitting/receiving methodology being used (often in the form of a standard document).

PICS proforma- Protocol Implementation Conformance Statement (PICS) proforma identifies the major characteristics of the standard in a questionnaire form.

The PICS does not represent a complete description of the standard, but provides a condensed representation suitable for the conformance test process.

Packet Switching- Switching technique that breaks messages into smaller units (packets) and then individually addressed and routed through the network with storage at intermediate nodes if necessary until the next portion of path is available.

Packet Layer- The layer of X.25 corresponding to partial network layer in OSI Reference Model OSI is concerned not only with the transfer of information between systems, i.e., transmission, but also with their capability to interwork to achieve a common (distributed) task. In other words, OSI is concerned with the interconnection aspects of cooperation between systems.

6.2 X.25 Services.

NAS open systems interfacing to NADIN-PSN may implement the following X.25 services in accordance with CCITT X.25 (1984 version):

(1) Types of Service -- There are two types of services: virtual call (VC) and permanent virtual circuit (PVC). The former service is the most commonly

used. Virtual calls go through three phases: call set-up, data transfer, and call clearing. An X.25 option, "Fast Select," allows small amounts of data to be transmitted during call set-up and allows immediate call clearing. This combines the three phases and minimizes the overhead involved. PVCs are initiated when users join the network and are left connected permanently; therefore, there is no call set-up or call clearing. PVCs are used when data is frequently exchanged and the delay involved in call set-up is not acceptable. Since the end users and the network or networks involved in a PVC must permanently reserve resources for these circuits, they should be used only where a true need exists.

(2) Delivery Confirmation Bit (D-Bit) -- End-to-End delivery confirmation is a layer 4 function in the OSI model. However, it can sometimes be useful to have this function performed in the Network Layer. In the normal mode of operation, the communications equipment acknowledges receipt of a packet back to the sender immediately. Setting the D-bit to "1" causes the communications equipment to withhold this acknowledgment until confirmation of receipt of a packet by the destination DTE has been received by the communication equipment. This can be useful if the particular connection does not use a standard layer 4 protocol providing end-to-end confirmation. An example would be the gateway between NADIN PSN and MSN. Since the use of the D-bit can limit throughput and increase delay time it it, should not be used unless it is absolutely necessary. Throughput reduction can be minimized by using the D-bit in coordination with the M-bit.

(3) The More Data Mark bit (M-bit) -- The M-bit is used to mark a sequence of multiple data packets, typically packets that are part of a single message.

Setting the M-bit to "1" indicates that more packets in the same sequence are to be received at the destination DTE. The Network Layer entity in the destination DTE will reassemble the packets into a single message before passing the message up to the Transport Layer. The most efficient way of combining the M-bit and the D-bit is to set the D-bit to "1" on only the last packet of a sequence. The X.25 networks deliver packets in order, therefore, if end-to-end acknowledgment of the last packet is received. It guarantees that the entire sequence was received.

(4) Data Qualifier Bit (Q-bit) -- The data qualifier bit, the Q-bit, is sent transparently by X.25 networks. This means that it can be used by the two DTEs for any predefined purpose. Its use in communicating with packet assemblers/disassemblers (PAD) is described by CCITT Recommendation X.29. Because of potential unforeseen problems, it is recommended that this bit not be used except for communicating with PADs.

(5) Nonstandard Default Packet Size -- The standard default packet size for X.25 networks is 128 octets of user data. The NADIN PSN's initial default packet size is 256 octets. This is the maximum amount of user data in a packet. Smaller amounts of data can be sent and no padding is required. This facility would be selected if a different size packet would optimize information transfer. It is more efficient to minimize the number of packets,. Thus, if a user typically sends lone, multi-packet messages, a larger packet size will improve performance. Excessively large packet sizes, on the other hand, waste buffer space in both the DTE and the network. Values other than the default value can

be selected during call set-up using the "flow control parameter negotiation" facility.

(6) Nonstandard Default Window Size -- The window size is the number of packets that can be outstanding for which an acknowledgment has not yet been received by the DTE or DCE. The standard default window size is 2. Thus, if there are two outstanding packets, the sending DTE cannot send additional packets until one or both have been acknowledged by the receiving DCE. The window size can be adjusted to optimize performance. Too large a window requires large buffers and may result in many packets being retransmitted if an error occurs. Too small a window results in frequent flow control restrictions and lower throughput. Values other than the default value can be selected during call set-up via the "flow control parameter negotiation" facility.

(7) Closed User Group-Related Facilities -- This is a group of seven related facilities that allow limits to be placed on users relating to which users they may call or which users may call them. Examples include a closed user group with incoming access (members of the group can call only each other, but anyone can call into the group), and outgoing calls barred within a closed user group (members of the group cannot call each other, but may call or be called by anyone else). In the NAS, external users such as airlines will be restricted from calling any addresses other than those to which they have authorized access.

(8) Call Redirection -- If this facility is used, it must be subscribed to; it cannot be selected on a call-by-call basis. It allows calls to be redirected

if the destination DTE is out of service or busy. The destination DTE subscribes to the type of call redirection desired. Four options are allowed by the NADIN PSN network: no redirection, automatic redirection, semi-automatic redirection, or manual redirection. Automatic redirection occurs immediately upon detection of the destination being out of service. Semi-automatic redirection occurs after a destination fails and the NADIN PSN Network Control Center (NCC) authorizes redirection. Manual redirection occurs upon command from the network control center. Up to three alternate subnetwork addresses can be associated with a given desired destination address. They form a list that is tried in order if automatic redirection is used. If manual or semi-automatic redirection has been selected, the network control center specifies which of the three alternate addresses is to be used.

APPENDIX A

Profile Requirements List (PRL)

ISO 8650-2 Association Control Service Element - Part 2: Protocol Implementation Conformance Statement (PICS) Proforma

When ISO 8650 is supported, the protocol implementation shall conform to the following PRLs. For each value that's optional under the ISO Status column, IRD/ICD writers shall determine whether it's mandatory, optional, or not applicable under the NAS Supports column.

		ISO status	NAS supports
Item	Protocol Mechanism	D	I
1	Normal mode	O	
2	X.410-1984 mode	O	
3	Rules for extensibility	M	M
4	Supports operation of session W2	O	

Table A-1 Supported Functions.

Note: One or both of Normal mode and X.410-1984 mode shall be supported for conformance to ISO 8650.

ANNEX A (PICS Proforma) of ISO DIS 8650-2 can be referenced for additional information. ISO 8650-1 contains the abbreviations used in ISO 8650-2.

D-Column - Indicates the level of support required for conformance to ISO 8650.

I-Column - To be completed by the supplier or implementor to indicate the level of implementation.

1

M Mandatory

O Optional

P Passed through from Session unrestricted

- Not Applicable

C.n The item is conditional (where n identifies the condition that is applicable). The definitions for the conditional

statements are given in Annex B of ISO 8650-2.

		ISO status	NAS Supports	
Item	Capability	D	I	Value
1	Association initiator	0		
2	Association responder	0		

Table A-2 Initiator/Responder Capability.

Note: One of the Association initiator or responder is mandatory in order

for a system to conform to ISO 8650.

		ISO Status	NAS Supports	ISO Status	NAS Supports	
Item	APDU	Send D	I	Receive D	I	Value
1	A-associate-request APDU (AARQ)	c1		c2		
2	A-associate-response APDU (AARE)	c2		c1		
3	A-release-request APDU (RLRQ)	0		M		
4	A-release-response APDU (RLRE)	M	M	c3		
5	A-abort APDU (ABBT)	c4		c4		

Table A-3 Supported Normal Mode APDUs.

		ISO Status	NAS Supports	
Item	Sending Parameter	D	I	Value
1	Protocol version	c5		
2	Application context name	M	M	
3	Calling AP title	0		
4	Calling AE qualifier	0		
5	Calling AP invocation-id	0		
6	Calling AE invocation-id	0		
7	Called AP title	0		
8	Called AE qualifier	0		
9	Called AP invocation-id	0		
10	Called AE invocation-id	0		
11	Implementation information	0		
12	User information	0		

		ISO Status	NAS Supports	
Item	Receiving Parameter	D	I	Value
13	Protocol version	M	M	
14	Application context name	M	M	
15	Calling AP title	M	M	
16	Calling AE qualifier	M	M	
17	Calling AP invocation-id	M	M	
18	Calling AE invocation-id	M	M	
19	Called AP title	M	M	
20	Called AE qualifier	M	M	
21	Called AP invocation-id	M	M	
22	Called AE invocation-id	M	M	
23	Implementation information	M	M	
24	User information	M	M	

Table A-4 A-Associated-Request APDU (AARQ).

		ISO Status	NAS Supports	
Sending Parameter	Item	D	I	Value
Protocol version	1	C5		
Application context name	2	M	M	
Responding AP title	3	O		
Responding AE qualifier	4	O		
Responding AP invocation-id	5	O		
Responding AE invocation-id	6	O		
Result	7	M	M	
Result source diagnostic	8	M	M	
Implementation information	9	O		
User information	10	O		

		ISO Status	NAS Supports	
Item	Receiving Parameter	D	I	Value
11	Protocol version	M	M	
12	Application context name	M	M	
13	Responding AP title	M	M	
14	Responding AE qualifier	M	M	
15	Responding AP invocation-id	M	M	
16	Responding AE invocation-id	M	M	
17	Result	M	M	
18	Result source diagnostic	M	M	
19	Implementation information	M	M	
20	User information	M	M	

Table A-5 A-Associated-Response APDU (AARE).

		ISO Status	NAS Supports	
	Sending Parameter	D	I	Value
	Reason	O		
Item	User information	O		

		ISO Status	NAS Supports	
Item	Receiving Parameter	D	I	Value
3	Reason	M	M	
4	User information	M	M	

Table A-6 A-Release-Request APDU (RLRQ).

		ISO Status	NAS Supports	
Item	Sending Parameter	D	I	Value
1	Reason	0		
2	User information	0		
		ISO Status	NAS Supports	
Receiving Parameter	Item	D	I	Value
Reason	3	M	M	
User information	4	M	M	

Table A-7 A-Release-Response APDU (RLRE).

		ISO Status	NAS Supports	
Item	Sending Parameter	D	I	Value
1	Abort source	M	M	
2	User information	0		

		ISO Status	NAS Supports	
Item	Receiving Parameter	D	I	Value
3	Abort source	M	M	
4	User Information	M	M	

Table A-8 Abort APDU (ABRT).

		ISO Status	NAS Supports	ISO Status	NAS Supports	
Item	Syntax Form	Send D	I	Receive D	I	Value
1	Form 1 (Directory Name)	0		M	M	
2	Form 2 (Object Id and Integer)	0		M	M	

Table A-9 AE Title Syntax Name-Form.

APPENDIX B

Profile Requirements List (PRL)

ISO 8571-5 File Transfer, Access and Management - Part 5: Protocol Implementation Conformance Statement (PICS) Proforma

When ISO 8571-5 is supported, the protocol implementation shall conform to the following PRLs. For each value that's optional under the ISO Status column, IRD/ICD writers shall determine whether it's mandatory, optional, or not applicable under the NAS Supports (I or R) column.

		ISO status	NAS supports
Item	File Model	D	R
1	Hierarchical	O	
2	Other models (specify or detail in an appendix)		

Table B-1 File Model.

Note: ANNEX A (PICS Proforma) of ISO 8571-5 can be referenced for additional information.

D-Column - Indicates the level of support required for conformance to ISO 8571.

R-Column - To be completed by the supplier or implementor to indicate the level of implementation.

For attributes:

f - full support of the attribute is required.

p - partial support of the attribute is permitted.

1

M Mandatory

O Optional

P Passed through from Session unrestricted

- Not Applicable

C.n The item is conditional (where "n" identifies the condition that is applicable).

		ISO Status	NAS Supports
Item	Attribute groups implemented	D	I R
1	Kernel	M	
2	Storage	O	
3	Security	O	
4	Private	O	

Table B-2 Attributes Groups Implemented.

Complete the tables for all supported attribute groups, shown in Table L-2:

		ISO Status	NAS Supports	
Item	Kernel Group (Initiator)	D	I full	Range of Values
1	Filename	f		See A.10.2.3
2	Permitted Actions	f		
3	Contents Type	f		See A.12.7

	Kernel Group (Responder)			
4	Filename	f		
5	Permitted Actions	f		
6	Contents Type	f		See A.12.7

	Storage Group (Initiator)			
7	Storage account	f		
8	Data and time of creation	f		
9	File availability	f		
10	Future filesize	f		
	Storage Group (Responder)			
		D	R full	R partial

11	Storage account	p		
12	Data and time of creation	p		
13	Data and time of last modification	p		
14	Data and time of last read access	p		
15	Data and time of last attribute modification	p		
16	Identity of creator	p		

17	Identity of last modifier	p		
18	Identity of last reader	p		
19	Identity of last attribute modifier	p		
20	File availability	p		
21	Filesize	p		
22	Future filesize	p		
	Security Group (Initiator)	D	I full	
23	Access control	f		See A.12.2
24	Legal qualification	f		
	Security Group (Responder)	D	R full R partial	
25	Access control	p		See A.12.2
26	Legal qualifications	p		
	Private Group (Initiator)	D	I full	
27	Private use	f		
	Private Group (Responder)	D	R full R partial	
28	Private use	p		

Table B-3 Attribute Values.

		ISO Status	NAS Supports	
Item	Constraint Set Name	D	I R	Depth
1	Unstructured	0		Not Applicable
2	Sequential Flat	0		Not Applicable
3	Ordered flat	0		Not Applicable
4	Ordered flat with unique names	0		Not Applicable
5	Ordered hierarchical	0		
6	General hierarchical	0		
	General hierarchical with unique names	?		

Table B-4 File Structures - Constraint Sets.

CONSTRAINT SET								
Item	ACTION	unstructured		sequential flat		ordered flat		ordered flat with unique names
		D	R	D	R	D	R	
1	Locate	—	—	0		0		0
2	Read	0		0		0		0
3	Insert	—	—	0		0		0
4	Replace	0		—	—	0		0
5	Extend	0		—	—	0		0
6	Erase	0		0		0		0

Table B-5 File Actions.

Item		D	I	D	R	
1	F-INITIALIZE PDU	M		M		
	FIELD NAME					Range of Values Or Reference
2	State result	—	—	M		all values defined in ISO 8571
3	Action result	—	—	M		all values defined in ISO 8571
4	Protocol version	M		M		See Section 2
5	Implementation Information	0		0		See A.12.1
6	Presentation context management	M		M		See note 1
7	Service units	M		M		See A.12.4
8	Functional units	M		M		See A.12.5
9	Attribute groups	M		M		See A.10.2
10	Shared ASE information	M		0		See A.12.9
11	FTAM quality of service	M		M		See A.12.8
12	Contents type list	0		0		See A.12.8
13	Initiator identity	0		—	—	N/A
14	Account	0		—	—	N/A
15	Filestore password	0		—	—	See A.12.11
16	Diagnostic	—	—	0		See A.12.6
17	Checkpoint window	M		M		See note 2

Table B-6 FTAM Regime Establishment.

Notes:

- 1) The values available for the presentation context management field depend upon the functional units implemented in ISO 8823.

2) Checkpoint window field is indicated as mandatory in accordance with ISO 8571-4. The field is defaulted to the value 1.

Item		D	I	R	
1	F-TERMINATE PDU	M		M	
	FIELD NAME				Range of Values Or Reference
2	Shared ASE information	0		0	See A.12.9
3	Charging	–	–	0	See A.12.10

Table B-7 FTAM Regime Termination (orderly).

Item		D	I	R	
1	F-P-ABORT PDU	M			
	FIELD NAME				Range of Values Or Reference
2	Action result	M			all values defined in ISO 8571
3	Diagnostic	0			See A.12.6

Table B-8 FTAM Regime Termination (abrupt) by Service Provider.

Item		D	I	R		
1	F-SELECT PDU	M		M		
	FIELD NAME				Range of Values Or Reference	
2	State result	—	—	M	all values defined in ISO 8571	
3	Action result	—	—	M	all values defined in ISO 8571	
4	Attributes	M		M	See A.10.2	
5	Requested access	M		—	—	See A.12.16
6	Access passwords	0		—	—	See A.12.3.5
7	Concurrency control	0		—	—	See A.12.13
8	Shared ASE Information	0		0		See A.12.9
9	Account	0		—	—	N/A
10	Diagnostic	—	—	0		See A.12.6

Table B-9 File Selection.

Item		D	I	D	R	
1	F-DESELECT PDU	M		M		
	FIELD NAME					Range of Values Or Reference
2	Action result	–	–	M		all values defined in ISO 8571
3	Charging	–	–	0		See A.12.10
4	Shared ASE information	0		0		See A.12.9
5	Diagnostic	–	–	0		See A.12.6

Table B-10 File Deslection.

Item		D	I	D	R	
1	F-CREATE PDU	0		0		
	FIELD NAME					Range of Values Or Reference
2	State result	–	–	M		all values defined in ISO 8571
3	Action result	–	–	M		all values defined in ISO 8571
4	Override	M		–	–	See A.12.15
5	Initial attributes	M		M		See A.10.2
6	Create password	0		–	–	See A.12.12
7	Requested access	M		–	–	See A.12.16
8	Access passwords	0		–	–	See A.12.3.5 and A12.3.6
9	Concurrency control	0		–	–	See A.12.13
10	Shared ASE information	0		0		See A.12.9
11	Account	0		–	–	N/A
12	Diagnostic	–	–	0		See A.12.6

Table B-11 File creation.

Item		D	I	D	R	
1	F-DELETE PDU	0		0		
	FIELD NAME					Range of Values Or Reference
2	Action result	–	–	M		all values defined in ISO 8571
3	Shared ASE information	0		0		See A.12.9
4	Charging	–	–	0		See A.12.10
5	Diagnostic	–	–	0		See A.12.6

Table B-12 File Delection.

Item		D	I	R	
1	F-READ-ATTRIB PDU	0		0	See A.11
	FIELD NAME				Range of Values Or Reference
2	Action result	–	–	M	all values defined in ISO 8571
3	Attribute names	M		–	N/A
4	Attributes	–	–	0	See A.10.2

5	Diagnostic	–	–	0	See A.12.6
---	------------	---	---	---	------------

Table B-13 Read Attributes.

Item		D	I	R	
1	F-CHANGE-ATTRIB PDU	0		0	See A.11
	FIELD NAME				Range of Values Or Reference
2	Action result	–	–	M	all values defined in ISO 8571
3	Attributes	M	–	0	See A.10.2
4	Diagnostic	–	–	0	See A.12.6

Table B-14 Change Attributes.

Item		D	I	R	
1	F-OPEN PDU	0		0	See A.11
	FIELD NAME				Range of Values Or Reference
2	State result	–	–	M	all values defined in ISO 8571
3	Action result	–	–	0	all values defined in ISO 8571
4	Processing mode	M		–	See A.12.17

5	Contents type	M		M	See A.12.7.2
6	Concurrency control	0		0	See A.12.13
7	Shared ASE information	0		0	See A.12.9
8	Enable FADU locking	M		–	See note 3
9	Activity identifier	0		–	N/A
10	Diagnostic	–	–	0	See A.12.6

11	Recovery mode	M		M	See A.12.18
12	Remove contexts	0		–	max number of presentation context
13	Define contexts	0		–	N/A
14	Presentation action	–	–	M	See notes 1 and 2

Table B-15 File Open.

Notes:

- 1) The values available for the presentation action field depend upon the functional units implemented in ISO 8823.
- 2) Presentation action field is indicated as mandatory in accordance with ISO 8571-4. The field is defaulted to no action.
- 3) Enable FADU Locking field is indicated as mandatory in accordance with ISO 8471-4. The field is defaulted to false.

Item		D	I	D	R	
1	F-CLOSE PDU	0		0		See A.11
	FIELD NAME					Range of Values Or Reference
2	Action result	M		M		all values defined in ISO 8571
3	Shared ASE information	0		0		See A.12.9
4	Diagnostic	0		0		See A.12.6

Table B-16 File Close.

Item		D	I	D	R	
1	F-BEGIN-GROUP PDU	0		0		See A.11
	FIELD NAME					Range of Values Or Reference
2	Threshold	M		-	-	

Table B-17 Beginning of Grouping.

Item		D	I	D	R	
1	F-END-GROUP PDU	0		0		See A.11
	The F-END-GROUP PDU carries no fields.					

Table B-18 End of Grouping.

Item		D	I	D	R	
1	F-RECOVER PDU	0		0		See A.11
	FIELD NAME					Range of Values Or Reference
2	State result	-	-	M		all values defined in ISO 8571
3	Action result	-	-	M		all values defined in ISO 8571
4	Activity identifier	M		-	-	

5	Bulk transfer number	M		-	-	
6	Requested access	M		-	-	See A.12.16
7	Access passwords	0		-	-	See A.12.3.5, A.12.3.6
8	Contents type	-	-	M		See A.12.7.2
9	Recovery point	M		M		
10	Diagnostic	-	-	0		See A.12.6

11	Remove contexts	0		-	-	See notes
12	Define contexts	0		-	-	See notes
13	Presentation action	-	-	M		See notes

Table B-19 Regime Recovery.

Notes:

- 1) The values available for the presentation action field depend upon the functional units implemented in ISO 8823.
- 2) Presentation action field is indicated as mandatory in accordance with ISO 8571-4. The field is defaulted to no action.

Item		D	I	D	R	
1	F-LOCATE PDU	0		0		See A.11
	FIELD NAME					Range of Values Or Reference
2	Action result	-	-	M		all values defined in ISO 8571
3	FADU identity	M		0		
4	FADU lock	0		-	-	See A.12.14
5	Diagnostic	-	-	0		See A.12.6

Table B-20 Locate File Access Data Unit.

Item		D	I	D	R	
1	F-ERASE PDU	0		0		See A.11
	FIELD NAME					Range of Values Or Reference
2	Action result	-	-	M		all values defined in ISO 8571
3	FADU identity	M		-	-	
4	Diagnostic	-	-	0		See A.12.6

Table B-21 Erase File Access Data Unit.

Item		D	I	D	R	
1	F-READ PDU	0		0		See A.11
	FIELD NAME					Range of Values Or Reference
2	FADU identity	M				
3	Access context	M				See A.10.3.2.3
4	FADU lock	0				See A.12.14

Table B-22 Read Bulk Data.

Item		D	I	D	R	
1	F-WRITE PDU	0		0		See A.11
	FIELD NAME					Range of Values Or Reference
2	FADU operation	M				
3	FADU identity	M				
4	FADU lock	0				See A.12.14

Table B-23 Write Bulk Data.

Item		D	I	D	R	
1	F-DATA-END PDU	0		0		See A.11
	FIELD NAME					Range of Values Or Reference
2	Action result	M				all values defined in ISO 8571
3	Diagnostic	0				See A.12.6

Table B-24 End of Data Transfer.

Item		D	I	R	
1	F-TRANSFER-END PDU	0		0	See A.11
	FIELD NAME				Range of Values Or Reference
2	Action result	-	-	M	all values defined in ISO 8571
3	Shared ASE information	0		0	See A.12.9
4	Diagnostic	-	-	0	See A.12.6

Table B-25 End of Transfer.

Item		D	I	R	
1	F-CANCEL PDU	0			See A.11
	FIELD NAME				Range of Values Or Reference
2	Action result	M			all values defined in ISO 8571
3	Shared ASE information	0			See A.12.9
4	Diagnostic	0			See A.12.6

Table B-26 Cancel Data Transfer.

The attributes of Table B-25 shall be implemented if implementation of both the following is required:

- a) the security attribute group
- b) full support of the access control attribute

Item	Access control element terms	D	I	R	Range of values
1	Action list	M			See A.12.3.1 and A.12.3.2
2	Concurrency access	0			See A.12.3.3
3	Identity	0			See A.12.3.4
4	Passwords	0			See A.12.3.5 and 12.3.6
5	Location	0			See A.12.3.7

Table B-27 Access Control Detail.

Item	Access control element terms	D I R	Range of values
1	Action list	M	See A.12.3.1 and A.12.3.2
2	Concurrency access	0	See A.12.3.3
3	Identity	0	See A.12.3.4
4	Passwords	0	See A.12.3.5 and 12.3.6
5	Location	0	See A.12.3.7
6	Maximum number of access control elements supported		

Table B-28 Access Control Detail.

Item	Action	not required D I R	shared D I R	exclusive D I R	no access D I R
1	Read	0	0	0	0
2	Insert	0	0	0	0
3	Replace	0	0	0	0
4	Extend	0	0	0	0
5					

Table B-29 Concurrency Access Term.

APPENDIX C

Profile Requirements List (PRL)

ISO 8823 Connection Oriented Presentation Protocol Specification

When ISO 8823 is supported, the protocol implementation shall conform to the following PRLs. For each value that's optional under the ISO Status column, IRD/ICD writers shall determine whether it's mandatory, optional, or not applicable under the NAS Supports column:

		ISO status	NAS supports
Item	capability	D	I
1	Initiator	0	
2	Responder	0	

Table C-1 Initiator/Responder Capabilities.

Note: One of these capabilities is mandatory if a system claims conformance to this standard.

Note: ANNEX A (PICS Proforma) of ISO DIS 8823-2 can be referenced for additional information.

1

D-column This column indicates the level of support required in order

to be conformed with ISO 8823.

I-column This column indicates the level of implementation of each

feature

M Mandatory

O Optional

P Passed through from Session unrestricted

- Not Applicable

C.n The item is conditional (where "n" identifies the condition

that is applicable).

		ISO status	NAS supports
Item	Mode	0	I
1	X.410 (1984)	0	
2	Normal	0	

Table C-2 Protocol Mechanisms.

Note: One of these modes is mandatory if a system claims conformance to this standard.

		Reference ISO 8823	ISO Status	NAS Supports
Item	Presentation Functional Unit	5.4	0	I
1	Kernel		M	M
2	Presentation context Management		0	
3	Presentation context Restoration		01	

Table C-3 Functional Units Part 1.

		Reference ISO 8823	ISO Status	NAS Supports
Item	Session Functional Unit	5.4	0	I
4	Negotiated Release		0	
5	Half-Duplex		0	
6	Duplex		0	
7	Expedited Data		0	
8	Typed Data		0	
9	Capability Data Exchange		0	
10	Minor Synchronize		0	
11	Major Synchronize		0	
12	Resynchronize		0	
13	Exceptions		0	
14	Activity Management		0	

Table C-4 Functional Units Part 2.

Complete the appropriate tables in Table J-5 thru J-17 only if support of the functional unit are claimed in Table J-3 or J-4.

		Reference ISO 8823	ISO Status	NAS Supports	ISO Status	NAS Supports
Item	Presentation PDU	N/A	Send 0	I	Receive 0	I
1	CP		02		03	
2	CPA		03		02	
3	CPR		03		02	
4	ARP		M	M	M	M
5	ARV		M	M	M	M
6	TD		M	M	M	M

Table C-5 Kernel Functional Unit Part 1.

		Reference ISO 8823	ISO Status	NAS Supports	ISO Status	NAS Supports
Item	Session Primitive	N/A	Send 0	I	Receive 0	I
7	S-REL-req		M	M	M	M
8	S-REL-rsp		M	M	M	M

Table C-6 Kernel Functional Unit Part 2.

		Reference ISO 8823	ISO Status	NAS Supports	ISO Status	NAS Supports
Item	Presentation PDU	N/A	Send 0	I	Receive 0	I
1	AC		0		M	
2	ACA		M		M	

Table C-7 Presentation Context Management Functional Unit.

		Reference ISO 8823	ISO Status	NAS Supports	ISO Status	NAS Supports
Item	Session Primitive	N/A	Send 0	I	Receive 0	I
1	S-REL-rsp(-)/cnf(-)		0		M	
2	S-GT-req/ind		0		M	
3	S-PT-req/ind		0		M	

Table C-8 Session Negotiated Release Functional Unit.

		Reference ISO 8823	ISO Status	NAS Supports	ISO Status	NAS Supports
Item	Session Primitive	N/A	Send 0	I	Receive 0	I
1	S-GT-req/ind		0		M	
2	S-PT-req/ind		0		M	

Table C-9 Session Half Duplex Functional Unit.

		Reference ISO 8823	ISO Status	NAS Supports	ISO Status	NAS Supports
Item	Presentation PDU	N/A	Send 0	I	Receive 0	I
1	TE		0		M	

Table C-10 Session Expedited Data Functional Unit.

		Reference ISO 8823	ISO Status	NAS Supports	ISO Status	NAS Supports
Item	Presentation PDU	N/A	Send 0	I	Receive 0	I
			1		TTD	

Table C-11 Session Type Data Functional Unit.

		Reference ISO 8823	ISO Status	NAS Supports	ISO Status	NAS Supports
Item	Presentation PDU	N/A	Send 0	I	Receive 0	I
1	TC		0		M	
2	TCC		M		M	

Table C-12 Session Capability Data Exchange Functional Unit.

		Reference ISO 8823	ISO Status	NAS Supports	ISO Status	NAS Supports
Item	Session Primitive	N/A	Send 0	I	Receive 0	I
1	S-SPNM-req/ind		0		M	
2	S-SPNM-rsp/cnf		0		M	
3	S-GT-req/ind		0		M	
4	S-PT-req/ind		0		M	

Table C-13 Session Minor Synchronize Functional Unit.

		Reference ISO 8823	ISO Status	NAS Supports	ISO Status	NAS Supports
Item	Session Primitive	N/A	Send 0	I	Receive 0	I
1	S-SPNM-req/ind		0		M	
2	S-SPNM-rsp/cnf		M		M	
3	S-GT-req/ind		0		M	
4	S-PT-req/ind		0		M	

Table C-14 Session Major Synchronize Functional Unit.

		Reference ISO 8823	ISO Status	NAS Supports	ISO Status	NAS Supports
Item	Presentation PDU	N/A	Send 0	I	Receive 0	I
1	RSA		M		M	
2	RS		0		M	

Table C-15 Session Resynchronize Functional Unit.

		Reference ISO 8823	ISO Status	NAS Supports	ISO Status	NAS Supports
Item	Session Primitive	N/A	Send 0	I	Receive 0	I
1	S-ACTS-req/ind		0		M	
2	S-ACTR-req/ind		0		M	
3	S-ACTI-req/ind		0		M	
4	S-ACTI-rsp/ind		M		M	
5	S-ACTD-req/ind		0		M	
6	S-ACTD-rsp/ind		M		M	
7	S-ACTE-req/ind		0		M	
8	S-ACTE-rsp/cnf		M		M	
9	S-GT-req/ind		0		M	
10	S-PT-req/ind		0		M	
11	S-CG-req/ind		0		M	

Table C-16 Session Activity Management Functional Unit.

		Reference ISO 8823	ISO Status	NAS Supports	ISO Status	NAS Supports
Item	Session Primitive	N/A	Send 0	I	Receive 0	I
1	S-VER-req/ind		0		M	
2	S-PER-ind		-		M	

Table C-17 Session Exceptions Functional Unit.

Complete the appropriate tables in Table J-18 thru J-57 only if support of the relevant PPDU was claimed in Table J-5, J-6, J-7, ..., or J-17.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Presentation	6.2.2; Table 1, 8.2	0	I	value
1	Calling Presentation selector		0		
2	Called Presentation selector		0		
3	Mode selector		M		
4	Presentation context definition list		0		
5	Default context name		0		
6	Protocol version		0		
7	User session requirements		0		
8	User data		0		

Table C-18 Connect Presentation - Presentation-Protocol-Data-Unit (CP PPDU)- sending Part 1.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Mapped to Session Service	6.2.2; Table 1; 8.2	D	I	Value
10	Calling Session address		P		
11	Called Session address		P		
12	Quality of service		P		
13	Revised Session requirements		P		
14	Initial synchronization point serial number		P		
15	Initial assignment of tokens		P		
16	Session connection identifier		P		

Table C-19 CP PPDU - Sending Part 2.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Presentation	6.2.2; Table 1; 8.2	D	I	Value
1	Calling Presentation selector		M		
2	Called Presentation selector		M		
3	Mode selector		M		
4	Presentation context definition list		M		
5	Default context name		M		
6	Protocol version		M		
7	Presentation requirements		M		
8	User session requirements		M		
9	User data		M		

Table C-20 CP PPDU - Receiving Part 1.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Mapped to Session Service	6.2.2; Table 1; 8.2	D	I	Value
10	Calling Session address		P		
11	Called Session address		P		
12	Quality of service		P		
13	Revised Session requirements		P		
14	Initial synchronization point serial number		P		
15	Initial assignment of tokens		P		
16	Session connection identifier		P		

Table C-21 CP PPDU - Receiving Part 2.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Presentation	6.2.3; Table 2, 8.2	O	I	Value
1	Responding Presentation selector		O		
2	Mode selector		M		
3	Presentation context definition result list		O		
4	Protocol version		O		
5	Presentation requirements		O		
6	User Session requirements		O		
7	User data		O		

Table C-22 Connect Presentation Accept (CPA) PPDU - Sending Part 1.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Mapped to Session Service	6.2.3; Table 2, 8.2	O	I	Value
8	Responding Session address		P		
9	Quality of service		P		
10	Revised Session requirements		P		
11	Initial synchronization point serial number		P		
12	Initial assignment of tokens		P		
13	Session connection identifier		P		

Table C-23 CPA PPDU - Sending Part 2.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Presentation	6.2.3; Table 2, 8.2	O	I	Value
1	Responding Presentation selec- tor		M		
2	Mode selector		M		
3	Presentation context definition result list		M		
4	Protocol version		M		
5	Presentation requirements		M		
6	User Session requirements		M		
7	User data		M		

Table C-24 CPA PPDU - Receiving Part 1.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Mapped to Session Service	6.2.3; Table 2, 8.2	0	1	Value
8	Responding Session address		P		
9	Quality of service		P		
10	Revised Session requirements		P		
11	Initial synchronization point serial number		P		
12	Initial assignment of tokens		P		
13	Session connection identifier		P		

Table C-25 CPA PPDU - Receiving Part 2.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Presentation	6.2.4; Table 3, 8.2	0	1	Value
1	Responding Presentation selector		0		
2	Presentation context definition result list		0		
3	Protocol version		0		
4	Default context result		0		
5	Provider reason		0		
6	User data		0		

Table C-26 Connect Presentation Reject (CPR) PPDU - Sending Part 1.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Mapped to Session Service	6.2.4; Table 3, 8.2	0	1	Value
7	Responding Session address		P		
8	Quality of service		P		
9	Session requirements		P		
10	Session connection identifier		P		

Table C-27 CPR PPDU - Sending Part 2.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Presentation	6.2.4; Table 3, 8.2	0	1	Value
1	Responding Presentation selector		M		
2	Presentation context definition result list		M		
3	Protocol version		M		
4	Default context result		M		
5	Provider reason		M		
6	User data		M		

Table C-28 CPR PPDU - Receiving Part 1.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Mapped to Session Service	6.2.4; Table 3, 8.2	0	I	Value
7	Responding Session address		P		
8	Quality of service		P		
9	Session requirements		P		
10	Session connection identifier		P		

Table C-29 CPR PPDU - Receiving Part 2.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Parameter	6.4.2; Table 5, 8.2	0	I	Value
1	Presentation context identifier list		0		
2	User data		0		

Table C-30 Abnormal Release User (ARU) PPDU - Sending.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Parameter	6.4.2; Table 5, 8.2	0	I	Value
1	Presentation context identifier list		M		
2	User data		M		

Table C-31 ARU PPDU - Receiving.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Parameter	6.4.3; Table 6, 8.2	0	I	Value
1	Provider reason		0		
2	Event identifier		0		

Table C-32 Abnormal Release Provider (ARP) PPDU - Sending .

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Parameter	6.4.3; Table 6, 8.2	0	I	Value
1	Provider reason		M		
2	Event identifier		M		

Table C-33 ARP PPDU - Receiving.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Parameter	6.5.2; Table 7,8.2	D	I	Value
1	Presentation context addition list		0		
2	Presentation context deletion list		0		
3	User data		0		

Table C-34 Alter Context (AC) PPDU - Sending.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Parameter	6.5.2, Table 7,8.2	D	I	Value
1	Presentation context addition list		M		
2	Presentation context deletion list		M		
3	User data		M		

Table C-35 AC PPDU - Receiving.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Parameter	6.5.3; Table 8,8.2	D	I	Value
1	Presentation context addition result list		0		
2	Presentation context deletion list		0		
3	User data		0		

Table C-36 Alter Context Acknowledge (ACA) PPDU - Sending.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Parameter	6.5.3; Table 8,8.2	D	I	Value
1	Presentation context addition list		M		
2	Presentation context deletion list		M		
3	User data		M		

Table C-37 ACA PPDU - Receiving.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Parameter	6.6.2.1; 8.2	D	I	Value
1	User data		0		

Table C-38 Presentation Data (TD) PPDU - Sending.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Parameter	6.6.2.1; 8.2	D	I	Value
1	User data		M		

Table C-39 TD PPDU - Receiving.

		Reference ISO 8823	ISO status	NAS Supports	
Item	Parameter	6.6.2.1; Table 8, 8.2	D	I	Value
1	User data		0		

Table C-40 Presentation Typed Data (TTD) PPDU - Sending.

		Reference ISO 8823	ISO status	NAS Supports	
Item	Parameter	6.6.2.1; Table 8, 8.2	D	I	Value
1	User data		M		

Table C-41 TTD PPDU - Receiving.

		Reference ISO 8823	ISO status	NAS Supports	
Item	Parameter	6.6.2.1; 8.2	D	I	Value
1	User data		0		

Table C-42 Expedited Data (TE) PPDU - Sending.

		Reference ISO 8823	ISO status	NAS Supports	
Item	Parameter	6.6.2.1; 8.2	D	I	Value
1	User data		M		

Table C-43 TE PPDU - Receiving.

		Reference ISO 8823	ISO status	NAS Supports	
Item	Parameter	6.6.2.1; 8.2	D	I	Value
1	User data		0		

Table C-44 Capability Data (TC) PPDU - Sending.

		Reference ISO 8823	ISO status	NAS Supports	
Item	Parameter	6.6.2.1; 8.2	D	I	Value
1	User data		M		

Table C-45 TC PPDU - Receiving.

		Reference ISO 8823	ISO status	NAS Supports	
Item	Parameter	6.6.2.1; 8.2	D	I	Value
1	User data		0		

Table C-46 Capability Data Acknowledge (TCC) PPDU - Sending.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Parameter	6.6.2.1; 8.2	D	I	Value
1	User data		M		

Table C-47 TCC PPDU - Receiving.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Presentation	6.8.2; Table 12; 8.2	D	I	Value
1	Presentation context identifier list		C4		
2	User data		0		

Table C-48 Resynchronize (RS) PPDU - Sending Part 1.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Mapped to Session Service	6.8.2; Table 12, 8.2	D	I	Value
3	Resynchronize type		P		
4	Synchronization point serial number		P		
5	Tokens		P		

Table C-49 RS PPDU - Sending Part 2.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Presentation	6.8.2; Table 12, 8.2	D	I	Value
1	Presentation context identifier list		C5		
2	User data		M		

Table C-50 RS PPDU - Receiving Part 1.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Mapped to Session Service	6.8.2; Table 12, 8.2	D	I	Value
3	Resynchronize type		P		
4	Synchronization point serial number		P		
5	Tokens		P		

Table C-51 RS PPDU - Receiving Part 2.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Presentation	6.8.3; Table 13, 8.2	D	I	Value
1	Presentation context identifier list		0		
2	User data		0		

Table C-52 Resynchronize Acknowledge (RSA) PPDU - Sending Part 1.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Mapped to Session Service	6.8.3; Table 13, 8.2	D	I	Value
3	Synchronization point serial number		P		
4	Tokens		P		

Table C-53 RSA PPDU - Sending Part 2.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Mapped to Session Service	6.8.3; Table 13, 8.2	D	I	Value
1	Presentation context identifier list		M		
2	User data		M		

Table C-54 RSA PPDU - Receiving Part 1.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Mapped to Session Service	6.8.3; Table 13, 8.2	D	I	Value
3	Synchronization point serial number		P		
4	Tokens		P		

Table C-55 RSA PPDU - Receiving Part 2.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Primitive	N/A	D	I	Value
1	S-REL-req		0		
2	S-REL-rsp		0		
3	S-PT-req		0		
4	S-SFNM-req		0		
5	S-SFNM-rsp		0		
6	S-SFNM-req		0		
7	S-SFNM-rsp		0		
8	S-VER-req		0		
9	S-ACTS-req		0		
10	S-ACTR-req		0		
11	S-ACTE-req		0		
12	S-ACTE-rsp		0		

Table C-56 Session Service Primitive not Carrying PPDUs - Sending.

		Reference ISO 8823	ISO Status	NAS Supports	
Item	Primitive	N/A	D	I	Value
1	S-REL-ind		M		
2	S-REL-cnf		M		
3	S-PT-ind		M		
4	S-SFNM-ind		M		
5	S-SFNM-cnf		M		
6	S-SFNM-ind		M		
7	S-SFNM-cnf		M		
8	S-UER-ind		M		
9	S-ACTS-ind		M		
10	S-ACTA-ind		M		
11	S-ACTE-ind		M		
12	S-ACTE-cnf		M		

Table C-57 Session Service Primitive not Carrying PPDUs - Receiving.

APPENDIX D

Profile Requirements List (PRL)

ISO 8073 Connection Oriented Transport Protocol Specification

When ISO 8073 is supported, the protocol implementation shall conform to the following PRLs. For each value that's optional under the ISO Status column, it might be necessary for the IRD/ICD writers to change it to mandatory or not applicable under the NAS Supports column.

Item		Reference ISO 8073:1988/	ISO Status	NAS Supports
A1	Network connection management procedure	Add.1:1988	O	O
A2	Explicit protocol identification	Add.1:1988	A1:M	A1:M

Table D-1 Addendum 1 - Network Connection Management Subprotocol (NCMS).

Item	Class	Reference ISO 8073:1988/	ISO Status	NAS Supports
C0	Class 0	14	O.1	N/A
C1	Class 1	14	C0:O	N/A
C2	Class 2	14	O.1	N/A
C3	Class 3	14	C2:O	N/A
C4	Class 4 operation over CONS	14	C2:O	O

C4L	Class 4 operation over CLNS	14	C2:O	M
-----	-----------------------------	----	------	---

Table D-2 Classes Implemented.

Note: ANNEX A (PICS Proforma) of ISO 8073:1988/AM3:1991 can be referenced for additional information.

C.n Optional, but support at least one of the group of options labelled by the same numeral n is required.

Index This predicate symbol means that the status following it applies only when the PICS states that the feature identified by the index is supported

Index When this group predicate is true the associated clause should be completed

N/A Not Applicable

P Prohibited

Item	Class	Reference ISO 8073:1988/Add 1	ISO status	NAS Supports
N1	Explicit protocol identification	6.2.2	A2:M	A2:M
N2	Network connection management	6.3.1	0	0
N3	Diagnostic	7.6.2, 7.7	0	0
N4	Active network connection recovery	7.4.2	0	0
N5	Passive network connection recovery	7.4.3	N2 OR N4:M	N2 OR N4:M
N6	Is an NCM TPDU with assignment right set to RA always rejected with N-DISCONNECT request?	6.4	0	0

Table D-3 Network Connection Management Subprotocol (NCMS) Functions.

Item	Class	Reference ISO 8073:1988	ISO status	NAS Supports
IR1	Initiating CR TPDU	14.5 a)	0.2	M
IR2	Responding to CR TPDU	14.5 b)	0.2	M

Table D-4 Initiator/Responder Capability for Protocol Class 0-4.

Note: ISO 8073 requires that at least one of the options marked "0.2" shall be implemented.

When ISO 8073 class 4 is supported, the protocol implementation shall conform to the following PRLs:

Item	Function	Reference (ISO 8073:1988)	ISO Status	NAS Supports
T4F1	TPDU Transfer	6.2	M	M
T4F2	Segmenting	6.3	M	M
T4F3	Reassembling	6.3	M	M
T4F4	Separation	6.4	M	M
T4F5	Connection establishment	6.5	M	M
T4F6	Connection refusal	6.6	M	M
T4F7	Data TPDU numbering (normal)	6.10	M	M
T4F8	Retention until acknowledgement of TPDU's (AK)	6.13	M	M
T4F9	Explicit flow control	6.16	M	M
T4F10	Checksum	6.17	M	M
T4F11	Frozen reference	6.18	M	M
T4F12	Retransmission on time-out	6.19	M	M
T4F13	Resequencing	6.20	M	M
T4F14	Inactivity control	6.21	M	M

Table D-5 Supported Functions for Class 4 (C4 OR C4L) Part 1.

Note: C4 - Class 4 operations over CONS

C4L - Class 4 operations over CLNS

The following functions are mandatory if Class 4 is operated over CONS:

Item	Function	Reference (ISO 8073:1988)	ISO Status	NAS Supports
T4F15	Assignment to network connection when operating over CONS	6.1.1	M	M
T4F16	Normal release when operating over CONS (explicit)	6.7.1	M	M
T4F17	Association of TPDU's with Transport connections when operating over CONS	6.9.1	M	M
T4F18	Expedited data transfer when operating over CONS (Network normal)	6.11.1	M	M
T4F19	Multiplexing when operating over CONS	6.15	M	M
T4F20	Demultiplexing when operating over CONS	6.15	M	M
T4F21	Treatment of protocol errors when operating over CONS	6.22.1	M	M
T4F22	Recombining when operating over CONS	6.23	M	M

Table D-6 Supported Functions for Class 4 (C4 OR C4L::) Part 2.

The following functions are mandatory if Class 4 is operated over CLNS:

Item	Function	Reference (ISO 8073:1988)	ISO Status	NAS Supports
T4F23	Transmission over CLNS	6.1.2	M	M
T4F24	Normal release when operating over CLNS (explicit)	6.7.2	M	M
T4F25	Association of TPDUs with Transport connections when operating over CLNS	6.9.2	M	M
T4F26	Expedited data transfer when operating over CLNS (Network normal)	6.11.2	M	M
T4F27	Treatment of protocol errors when operating over CLNS	6.22.2	M	M

Table D-7 Supported Functions for Class 4 (C4 OR C4L::) Part 3.

The following elements of procedure are optional:

Item	Function	Reference (ISO 8073:1988)	ISO Status	NAS Supports
T4F28	Data TPDV numbering (extended)	6.10	O	O
T4F29	Non-use of checksum	6.17	O	O
T4F30	Concatenation	6.4	O	O

Table D-8 Supported Functions for Class 4 (C4 OR C4L::) part 4.

The following functions is optional if Class 4 is operated over CONS:

Item	Function	Reference (ISO 8073:1988)	ISO Status	NAS Supports
T4F31	splitting when operating over CONS	6.23	O	O

Table D-9 Supported Functions for Class 4 (C4 OR C4L::) Part 5.

The following TPDUs and the parameters are mandatory if a corresponding predicate in the status column is true:

Item	TPDUs		Reference (ISO 8073:1988)	ISO Status	NAS Supports
ST1	CR	supported on transmission	13.1	IR1:M	IR1:M
ST2	CR	supported on receipt	13.1	IR2:M	IR2:M
ST3	CC	supported on transmission	13.1	IR2:M	IR2:M
ST4	CC	supported on receipt	13.1	IR1:M	IR1:M
ST5	DR	supported on transmission	13.1	IR2:M	IR2:M

ST6	DR	supported on receipt	13.1	IR1:M	IR1:M
ST7	DC	supported on transmission	13.1	C4 OR C4L:M	C4 OR C4L:M
ST8	DC	supported on receipt	13.1	C4 OR C4L:M	C4 OR C4L:M
ST9	DT	supported on transmission	13.1	M	M
ST10	DT	supported on receipt	13.1	M	M
ST11	ED	supported on transmission	13.1	C4 OR C4L:M	C4 OR C4L:M

ST12	ED	supported on receipt	13.1	C4 OR C4L:M	C4 OR C4L:M
ST13	AK	supported on transmission	13.1	C4 OR C4L:M	C4 OR C4L:M
ST14	AK	supported on receipt	13.1	C4 OR C4L:M	C4 OR C4L:M
ST15	EA	supported on transmission	13.1	C4 OR C4L:M	C4 OR C4L:M
ST16	EA	supported on receipt	13.1	C4 OR C4L:M	C4 OR C4L:M
ST19	ER	supported on receipt	13.1	M	M

Table D-10 Supported TPDUs Part 1.

Item	Function	Reference (ISO 8073:1988)	ISO Status	NAS Supports
SER4L	Class 4 over CLNS	6.22.2	0	M

Table D-11 Supported Parameters of Issued TPDUs.

The following TPDUs are mandatory if a corresponding predicate in the status column is true:

Item	TPDUs		Reference ISO 8073:1988/Add 1	ISO Status	NAS Supports
SN1	UN	supported on transmission	8.1	A1:M	A1:M
SN2	UN	supported on receipt	8.1	A1:M	A1:M
SN3	NCM	supported on transmission	8.1	N2:M	N2:M
SN4	NCM	supported on receipt	8.1	N2:M	N2:M
SN5	DIAG	supported on transmission	8.1	N3:M	N3:M
SN6	DIAG	supported on receipt	8.1	N3:M	N3:M
SN7	NCMC	supported on transmission	8.1	SN4 AND NOT N6:M	SN4 AND NOT N6:M
SN8	NCMC	supported on receipt	8.1	P1:M	P1:M

Table D-12 Supported TPDU's Part 2.

Note: SN3 AND the only supported value in IC5 is "receiver".

The following parameters are optional if a CR TPDU is issued with preferred Class 4:

Item	Supported Parameters	Reference ISO 8073:1988	ISO Status	NAS Supports
I4CR7	Called TSAP ID	13.3.4 a)	0	0
I4CR8	Calling TSAP ID	13.3.4 a)	0	0
I4CR9	TPDU size	13.3.4 b)	0	0
I4CR10	Version number	13.3.4 c)	0	0
I4CR11	Protection parameters	13.3.4 d)	0	0
I4CR12	Additional option selection	13.3.4 f)	0	0
I4CR13	Throughput	13.3.4 j)	0	0
I4CR14	Residual error rate	13.3.4 k)	0	0
I4CR15	Priority	FAA-STD-043A	0	M
I4CR16	Transit delay	13.3.4 n)	0	0
I4CR17	Acknowledge Time	13.3.4 h)	0	0

Table D-13 Supported Parameters for Class 4 TPDU's (C4 OR C4L) Part 1.

The following parameters are optional if a CC TPDU is issued in Class 4:

Item	Supported Parameters	Reference ISO 8073:1988	ISO Status	NAS Supports
I4CC6	Called TSAP ID	13.4.4	0	0
I4CC7	Calling TSAP ID	13.4.4	0	0
I4CC8	TPDU size	13.4.4	0	0
I4CC9	Protection parameters	13.4.4	0	0
I4CC10	Additional option selection	13.4.4	0	0
I4CC11	Acknowledge time	13.4.4	0	0
I4CC12	Throughput	13.4.4	0	0
I4CC13	Residual error rate	13.4.4	0	0
I4CC14	Priority	FAA-STD-043A	0	M
I4CC15	Transit delay	13.4.4	0	0

Table D-14 Supported Parameters for Class 4 TPDU's (C4 OR C4L) Part 2.

The following parameters is optional if a DR TPDU is issued in Class 4:

Item	Supported Parameters	Reference ISO 8073:1988	ISO Status	NAS Supports
I4DR4	Additional information	13.5.4 a)	0	0

Table D-15 Supported Parameters for Class 4 TPDU's (C4 OR C4L) Part 3.

The following parameters is mandatory if a AK TPDU is issued in Class 4:

Item	Supported Parameters	Reference ISO 8073:1988	ISO Status	NAS Supports
I4Ak4	Flow control confirmation	13.9.4 c)	0	M

Table D-16 Supported Parameters for Class 4 TPDUs (C4 OR C4L) Part 4.

If the implementation can reduce credit and does so in the manner outlined in ISO 8073 clause 12.2.3.8.2, then subsequence number in AK TPDU is mandatory. Otherwise complete itme I4AK5.

Item	Supported Parameters	Reference ISO 8073:1988	ISO Status	NAS Supports
I4AK5	Subsequence Number	13.9.4 b)	0	

Table D-17 Supported Parameters for Class 4 TPDUs (C4 OR C4L) Part 5.

The following parameter is optional if an ER TPDU is issued in Class 4:

Item	Supported Parameters	Reference ISO 8073:1988	ISO Status	NAS Supports
I4ER3	Invalid TPDV	13.12.4 a)	0	0

Table D-18 Supported Parameters for Class 4 TPDUs (C4 OR C4L) Part 6.

If use of checksum has been selected then it is mandatory to process a checksum parameter in the following TPDUs:

Item	TPDU	Reference ISO 8073:1988	ISO Status	NAS Supports
R4CCch	CC TPDV	13.4.4	M	M
R4DRch	DR TPDV	13.5.4 b)	M	M
R4DCch	DC TPDV	13.6.4	M	M
R4DTch	DT TPDV	13.7.4	M	M
R4EDch	ED TPDV	13.8.4	M	M
R4AKch	AK TPDV	13.9.4 a)	M	M
R4EAch	EA TPDV	13.10.4	M	M
R4ERch	ER TPDV	13.12.4 b)	M	M

Table D-19 TPDUs in Class 4 (C4 OR C4L).

Item	User Data	Reference ISO 8073:1988	ISO Status	NAS Supports
D4ICR	User data of up to 32 octets in a CR with preferred class 4	13.3.5	M	M
D4ICC	User data of up to 32 octets in a CC	13.4.5	M	M
D4IDR	User data of up to 64 octets in a DR	13.5.5	M	M

Table D-20 User Data in Issued TPDUs Class 4 (C4 OR C4L).

For Classes 1 to 4, if it is possible to initiate a CR TPDU then it shall be possible to receive the following:

Item	TPDU User Data	Reference ISO 8073:1988	ISO Status	NAS Supports
DRCC	32 octets of user data in a CC TPDV	13.4.5	M	M
DRDR	64 octets of user data in a DR TPDV	13.5.5	M	M

Table D-21 User Data in Received TPDUs Part 1.

For Classes 1 to 4, if it is possible to respond to a CR TPDU then it shall be possible to receive the following:

Item	TPDU User Data	Reference ISO 8073:1988	ISO Status	NAS Supports
DRCR	32 octets of user data in a CR TPDV	13.3.5	M	M

Table D-22 User Data in Received TPDUs Part 2.

Item	Feature	Reference ISO 8073:1988	NAS Supports
NC	The preferred class in the CR TPDV may contain any of the classes supported by the implementation	6.5.5 j)	Class 4

Table D-23 Class Negotiation - Initiator.

Item	Preferred Class	Reference ISO 8073:1988	ISO Allowed values	NAS Supports
NAC5	Class 4 over CLNS	6.5.5j	None	None

Table D-24 Class 4 Over CLNS.

Note: The class cannot be negotiated since Class 4 is the only class allowed over CLNS.

Item	Preferred Class	Reference ISO 8073:1988	ISO Allowed values	NAS Supports
RC4	What classes can you respond with if CR proposes only class 4?	6.5.4 h) Table 3	2, 4 or connection refused depending on classes supported	4
RC4a	What classes can you respond with if CR proposes class 4 as preferred class and the alternative class parameter is present?	6.5.4 h) Table 3	0,1,2,3,4 or connection refused depending on classes supported and coding of alternative class	4

Table D-25 Class Negotiation - Responder Side.

Item		Reference ISO 8073:1988	ISO Status	NAS Supports
TS	If maximum TPDV size is proposed in a CR TPDV then the initiator shall support all TPDV sizes from 128 octets to the maximum proposed ?	14.6	M	M

Table D-26 TPDV Size Negotiation Part 1.

Item	Preferred Class	Reference ISO 8073:1988	ISO Allowed values	NAS Supports
T4S1	What is the largest value of the maximum TPDV size parameter in a CR TPDV with preferred class 4?	14.6 e)	One of 128, 256, 512, 1024, 2048, 4096, 8192	One of 128, 256, 512, 1024, 2048, 4096, 8192
T4S2	What is the largest value of the maximum TPDV size parameter which may be sent in a CC TPDV when class 4 is selected?	14.6 e)	One of 128, 256, 512, 1024, 2048, 4096, 8192	One of 128, 256, 512, 1024, 2048, 4096, 8192

Table D-27 TPDV Size Negotiation Part 2.

Item	Extended Format	Reference ISO 8073:1988	Allowed Values	NAS Supports values
NEF3	What formats can you propose in the CR TPDV in class 4?	6.5.4 k) 6.5.5 j)	normal, extended	normal, extended
NEF6	What formats can you select in a CC when extended has been proposed in CR in class 4?	6.5.4 k) 6.5.5 j)	normal, extended	normal, extended

Table D-28 Use of Extended Format.

Item		Reference ISO 8073:1988	ISO Status	NAS Supports
TED1	Is the expedited data indication supported in CR and CC TPDV?	6.5.4 r), 6.5.5 m)	M	M

Table D-29 Expedited Data Transport Service.

Item	Non Use of Checksum	Reference ISO 8073:1988	Allowed Values	NAS Supports Values
NUC1	What proposals can you make in the CR?	6.5.4 m)	non use, use	non use, use
NUC2	What proposals can you make in CC when non use of checksum has been proposed in CR?	6.5.4 m) 6.5.5 k)	non use, use	non use

Table D-30 Non-use of Checksum ((CA OR C4L) AND T4F29::))

Item		Reference ISO 8073:1988	ISO Allowed Values	NAS Supports Values
FE4L	Class 4 over CLNS	6.22.2.3	C4L:ER, DR Discard	ER, DR Discard

Table D-31 Action on Receipt of a Protocol Error.

The following actions are mandatory:

Item	Event	Reference ISO 8073:1988	ISO Status	NAS Supports
RR1	A parameter not defined in ISO 8073 shall be ignored	13.2.3	M	M
RR2	An invalid value in the alternative protocol class parameter shall be treated as a protocol error	13.2.3	M	M
RR3	An invalid value in the class and option parameter shall be treated as a protocol error.	13.2.3	M	M
RR4	On receipt of the additional option selection parameter bits 8 to 5, and bits 4 to 1 if not meaningful for the proposed class shall be ignored.	13.3.4	M	M
RR5	If not-use of explicit flow control is proposed and bit 1 of the additional option selection equals 1, it shall be treated as a protocol error.	13.2.3	M	M
RR6	On receipt of the class option parameter bits 4 to 1 if not meaningful for the proposed class shall be ignored.	13.3.3	M	M

Table D-32 Actions on Receipt of an Invalid or Undefined Parameter in a CR TPDU

Part 1.

Item	Event	Reference ISO 8073:1988	Actions Allowed	NAS Supports
RR7	A parameter defined in ISO 8073 (other than those covered above) and having an invalid value	13.2.3	Ignore, Protocol Error	Ignore, Protocol Error

Table D-33 Actions on Receipt of an Invalid or Undefined Parameter in a CR TPDU

Part 2.

The following actions are mandatory:

Item	Event	Reference ISO 8073:1988	ISO Status	NAS Supports
UI1	A parameter not defined in ISO 8073 shall be treated as a protocol error	13.2.3	M	M
UI2	A parameter which has an invalid value as defined in ISO 8073 shall be treated as a protocol error.	13.2.3	M	M
UI3 (class 4 only)	A TPDU received with a checksum which does not satisfy the defined formula shall be discarded.	6.17.3	M	M

Table D-34 Actions on Receipt of an Invalid or Undefined Parameter in a TPDU

Other Than a CR TPDU.

The following actions are mandatory if Class 4 is supported:

Item	Event	Reference ISO 8073:1988	ISO Status	NAS Supports
TA1	T1	12.2.1	M	M
TA2	M	12.2.1	M	M
TA3	I	12.2.1	M	M
TA4	W	12.2.1	M	M
TA5	L	12.2.1	M	M

Table D-35 Timers and Protocol Parameters Part 1.

APPENDIX E

Profile Requirements List (PRL)

ISO 8473-1 Protocol for providing the connectionless-mode network service: Protocol Specification

Function	Full Protocol	Non-Segmenting subset	Inactive subset
PDU Composition	*1	1	1
PDU Decomposition	*1	1	1
Header Format Analysis	*1	1	1
PDU Lifetime Control	*1	1	N/A
Route PDU	*1	1	N/A
Forward PDU	*1	1	N/A
Segment PDU	*1	N/A	N/A
Reassemble PDU	*1	N/A	N/A
Discard PDU	*1	1	N/A
Error Reporting	*1	1	N/A
Header Error Detection	*1	1	N/A
Security	*2	2	N/A
Complete Source Routing	*2	2	N/A
Complete Route Recording	*2	2	N/A
Echo request	*2	2	N/A
Echo response	*2	2	N/A
Partial Source Routing	*3	3	N/A
Partial Route Recording	*3	3	N/A
Priority	*3	3	N/A
QoS Maintenance	*3	3	N/A
Congestion Notification	*3	3	N/A
Padding	*3	3	N/A

Table E-1 Classification of the ISO 8473-1 Functions.

The functions in Table C-1 are consisted of three types and are defined in ISO 8473-1:1994 as:

Type *1: These functions shall be supported.

Type *2: These functions may or may not be supported. If an implementation does not support a Type 2 function and the function is selected in a PDU, then that PDU shall be discarded, and an Error Report PDU shall be generated.

Type *3: These functions may or may not be supported ISO 8473-1:1994 can be referenced for more descriptions on Type 2 or Type 3 functions.

A NAS ES or IS protocol implementation shall conform to the following PRLs. For each value that's optional under the ISO Status column, it might be necessary for the IRD/ICD writers to change it to mandatory or not applicable under the NAS Supports column.

Item	Capability	Reference (ISO/IEC JEC 8473-1:1994)	ISO Status	NAS Supports
ES	End System		0.1	0.1
IS	Intermediate System		0.1	0.1
FL-r	<r>Full protocol	6	M	M
FL-s	<s>Full protocol	6	M	M
NSS- r	<r>Non-segmenting subset	5.2	M	M
NSS- s	<s>Non-segmenting subset	5.2	IS:M	IS:M
IAS- r	<r>Inactive subset	5.2	ES:0	ES:0
IAS- s	<s>Inactive subset	5.2	IAS-r:M	IAS-r:M
S802	SNDCF for ISO 8802	8473-2 5.4	0.2	0
SCLL	SNDCF for CL Link Service	8473-4 5.3.1	0.2	0
SX25	SNDCF for ISO 8208	8473-3 5.4	0.2	0
ATM SNDCF	SNDCF for Mobile Subnetwork	CMS/ATM-1 SABF's ref: Section 7	N/A	ISM0B:M ISGRD:0 ^IS:0

Table E-2 Major Capabilities.

Note:

ANNEX A (PICS Proforma) of ISO 8473-1:1994 can be referenced for additional information.

A NAS ES protocol implementation shall conform to the following PRL for supported functions.

Item	Function	Reference (ISO/IEC 8473-1:1994)	ISO Status	NAS Supports
ePDUC	PDU composition	6.1	M	M
ePDUD	PDU decomposition	6.2	M	M
eHFA	Header format analysts	6.3	M	M
ePDUL-s	<s>PDU lifetime control	6.4	M	M
ePDUL-r	<r>PDU lifetime control	6.4	0	0
eRout	Route PDU	6.5	M	M
eForw	Forward PDU	6.6	M	M
eSegm	Segment PDU	6.7	M	M
eReas	Reassemble PDU	6.8	M	M
eDisc	Discard PDU	6.9	M	M
eErep	Error reporting	6.10	M	M
eEdec-s	<s>Header error detection	6.11	M	M
eEdec-r	<r>Header error detection	6.11	M	M
eSecu-s	<s>Security	6.13	0	M
eSecu-r	<r>Security	6.13	0	M
eCRR-s	<s>Complete route recording	6.15	0	0
eCRR-r	<r>Complete route recording	6.15	0	0
ePRR-s	<s>Partial route recording	6.15	0	0
ePRR-r	<r>Partial route recoding	6.15	0	0
eCSR	Complete source routeing	6.14	0	0
ePSR	Partial source routeing	6.14	0	0
ePri-s	<s>Priority	6.17	0	M
ePri-r	<r>Priority	6.17	0	M
eQOSM-s	<s>QOS maintenance	6.16	0	M
eQOSM-r	<r>QOS maintenance	6.16	0	M
eCong-s	<s>Congestion notification	6.18	eQOSM-s:M	eQOSM-s:M
eCong-r	<r>Congestion notification	6.18	0	0
ePadd-s	<s>Padding	6.12	0	0
ePadd-r	<r>Padding	6.12	M	M
eEreq	Echo request	6.19	0	0
eErsp	Echo response	6.20	0	0
eSegS	Create segments smaller than necessary	6.8	0	0

Table E-3 End systems - Supported Functions.

Item	NPDU	Reference (ISO/IEC 8473-1:1994)	ISO status	NAS Supports
eDT-t	DT(full protocol)transmit	7.7	M	M
eDT-r	DT(full protocol)receive	7.7	M	M
eDTNS-t	DT(non-segmenting)transmit	7.7	NSS-s:M	NSS-s:M
eDTNS-r	DT(non-segmenting)receive	7.7	M	M
eER-t	ER transmit	7.9	M	M

eER-r	ER receive	7.9	M	M
eIN-t	Inactive PDU transmit	7.8	IAS-s:M	IAS-s:M
eIN-r	Inactive PDU receive	7.8	IAS-r:M	IAS-r:M
eERQ-t	ERQ transmit	7.10	eEreq:M	eEreq:M
eERQ-r	ERQ receive	7.10	M	M
eERP-t	ERP transmit	7.11	eErsp:M	eErsp:M
eERP-r	ERP receive	7.11	M	M

Table E-4 End Systems - Supported Protocol Data Units (PDUs).

Item	Parameters	Reference (ISO/IEC 8473-1:1994)	ISO status	NAS supports
edFxFt-s	<s>Fixed part	7.2	M	M
edFxFt-r	<r>Fixed part	7.2	M	M
edAddr-s	<s>Addresses	7.3	M	M
edAddr-r	<r>Addresses	7.3	M	M
edSeg-s	<s>Segmentation part	7.4	M	M
edSeg-r	<r>Segmentation part	7.4	M	M
edPadd-s	<s>Padding	7.5.2	ePadd- s:M	ePadd-s:M
edPadd-r	<r>Padding	7.5.2	M	M
edSecu-s	<s>Security	7.5.3	eSecu- s:M	eSecu-s:M
edSecu-r	<r>Security	7.5.3	eSecu- s:M	eSecu-s:M
edCRR-s	<s>Complete route recording	7.5.5	eCRR-s:M	eCRR-s:M
edCRR-r	<r>Complete route recording	7.5.5	eCRR-r:M	eCRR-r:M
edPRR-s	<s>Partial route recording	7.5.5	ePRR-s:M	ePRR-s:M
edPRR-r	<r>Partial route recording	7.5.5	ePRR-r:M	ePRR-r:M
edCSR-s	<s>Complete source routing	7.5.4	eCSR:M	eCSR:M
edPSR-s	<s>Partial source routing	7.5.4	ePSR:M	ePSR:M
edQOSM-s	<s>QOS maintenance	7.5.6	c1:M	c1:M
edQOSM-r	<r>QOS maintenance	7.5.6	c2:M	c2:M
edPri-s	<s>Priority	7.5.7	ePri-s:M	ePri-s:M
edPri-r	<r>Priority	7.5.7	ePri-r:M	ePri-r:M
edData-s	<s>Data	7.6	M	M
edData-r	<r>Data	7.6	M	M
edUnsup2	Are received PDUs containing parameters selecting unsupported Type 2 functions discarded and where appropriate an Error Report PDU generated ?	6.21	M	M
edUnsup2	Are parameters selecting unsupported Type 3 functions ignored ?	6.21	M	M

Table E-5 End Systems - Supported Data (DT) Parameters.

Note: Definition of conditional status entries

c1: eQOSM-s OR eCong-s

c2: eQOSM-r OR eCong-r

Item	Parameter	Reference (ISO/IEC 8473-1:1994)	ISO Status	NAS Supports
eeFxPt-s	<s>Fixed part	7.2	M	M
eeFxPt-r	<r>Fixed part	7.2	M	M
eeAddr-s	<s>Addresses	7.3	M	M
eeAddr-r	<r>Addresses	7.3	M	M
eePadd-s	<s>Padding	7.5.2	ePadd- s:M	ePadd-s:M
eePadd-r	<r>Padding	7.5.2	M	M
eeSecu-s	<s>Security	7.5.3	eSecu- s:M	eSecu-s:M
eeSecu-r	<r>Security	7.5.3	eSecu- r:M	eSecu-r:M
eeCRR-s	<s>Complete route recording	7.5.5	eCRR-s:M	eCRR-s:M
eeCRR-r	<r>Complete route recording	7.5.5	eCRR-r:M	eCRR-r:M
eePRR-s	<s>Partial route recording	7.5.5	ePRR-s:M	ePRR-s:M
eePRR-r	<r>Partial route recording	7.5.5	ePRR-r:M	ePRR-r:M
eeCSR-s	<s>Complete source routing	7.5.4	eCSR:M	eCSR:M
eePSR-s	<s>Partial source routing	7.5.4	ePSR:M	ePSR:M
eeQOSM-s	<s>QOS maintenance	7.5.6	c1:M	c1:M
eeQOSM-r	<r>QOS maintenance	7.5.6	c2:M	c2:M
eePri-s	<s>Priority	7.5.7	ePri-s:M	ePri-s:M
eePri-r	<r>Priority	7.5.7	ePri-r:M	ePri-r:M
eeDisc-s	<s>Reason for discard	7.9.5	M	M
eeDisc-r	<r>Reason for discard	7.9.5	M	M
eeData-s	<s>Data	7.9.6	M	M
eeData-r	<r>Data	7.9.6	M	M
eeUnSup2	Are received PDUs containing parameters selecting unsupported Type 2 functions discarded ?	6.21	M	M
eeUnSup3	Are parameters selecting unsupported Type 3 functions ignored ?	6.21	M	M

Table E-6 End Systems - Supported Error Report (ER) Parameters.

Note: Definition of conditional status entries:

c1: eQOSM-s OR eCong-s

C2: eQOSM-r OR eCong-r

Item	Parameter	Reference (ISO/IEC 8473-1:1994)	ISO Status	NAS Supports
eiNLPI-s	<s>Inactive network layer protocol identifier	7.8.2	IAS-s:M	IAS-s:M
eiNLPI-r	<r>Inactive network layer protocol identifier	7.8.2	IAS-r:M	IAS-r:M
eiData-s	<s>Data	7.8.3	IAS-s:M	IAS-s:M
eiData-r	<r>Data	7.8.3	IAS-r:M	IAS-r:M

Table E-7 Inactive Network Layer Protocol PDU Parameters.

Item	Parameter	Reference (ISO/IEC 8473-1:1994)	ISO Status	NAS Supports
eqFxPt-s	<s> Fixed part	7.2	M	M
eqFxPt-r	<r> Fixed part	7.2	M	M
eqAddr-s	<s> Addresses	7.3	M	M
eqAddr-r	<r> Addresses	7.3	M	M
eqSeg-s	<s> Segmentation part	7.4	M	M
eqSeg-r	<r> Segmentation part	7.4	M	M
eqPadd-s	<s> Padding	7.5.2	ePadd- s:M	ePadd-s:M
eqPadd-r	<r> Padding	7.5.2	M	M
eqSecu-s	<s> Security	7.5.3	eSecu- s:M	eSecu-s:M
eqSecu-r	<r> Security	7.5.3	eSecu- r:M	eSecu-r:M
eqCRR-s	<s> Complete route recording	7.5.5	eCRR-s:M	eCRR-s:M
eqCRR-r	<r> Complete route recording	7.5.5	eCRR-r:M	eCRR-r:M
eqPRR-s	<s> Partial route recording	7.5.5	ePRR-s:M	ePRR-s:M
eqPRR-r	<r> Partial route recording	7.5.5	ePRR-r:M	ePRR-r:M
eqCSR-s	<s> Complete source routing	7.5.4	eCSR-s:M	eCSR-s:M
eqPSR-s	<s> Partial source routing	7.5.4	ePSR-s:M	ePSR-s:M
eqQOSM-s	<s> QOS maintenance	7.5.6	c1:M	c1:M
eqQOSM-r	<r> QOS maintenance	7.5.6	c2:M	c2:M
eqPri-s	<s> Priority	7.5.7	ePri-s:M	ePri-s:M
eqPri-r	<r> Priority	7.5.7	ePri-r:M	ePri-r:M
eqData-s	<s> Data	7.6	M	M
eqData-r	<r> Data	7.6	M	M
eqUnsup2	Are received PDUs containing parameters selecting unsup- ported Type 2 functions dis- carded and where appropriate an Error Report PDU generated ?	6.21	M	M
eqUnsup2	Are parameters selecting un- supported Type 3 functions ig- nored ?	6.21	M	M

Table E-8 End Systems - Echo Request (ERQ) Parameters.

Note: Definition of conditional status entries:

c1: eQOSM-s OR eCong-s

c2: eQOSM-r OR eCong-r

Item	Parameter	Reference (ISO/IEC 8473 1:1994)	ISO Status	NAS Supports
epFxPt-s	<s>Fixed part	7.2	M	M
epFxPt-r	<r>Fixed part	7.2	M	M
epAddr-s	<s>Addresses	7.3	M	M
epAddr-r	<r>Addresses	7.3	M	M
epSeg-s	<s>Segmentation part	7.4	M	M
epSeg-r	<r>Segmentation part	7.4	M	M
epPadd-s	<s>Padding	7.5.2	ePadd- s:M	ePadd-s:M
epPadd-r	<r>Padding	7.5.2	M	M
epSecu-s	<s>Security	7.5.3	eSecu- s:M	eSecu-s:M
epSecu-r	<r>Security	7.5.3	eSecu- r:M	eSecu-r:M
epCRR-s	<s>Complete route recording	7.5.5	eCRR-s:M	eCRR-s:M
epCRR-r	<r>Complete route recording	7.5.5	eCRR- r:M	eCRR-r:M
epPRR-s	<s>Partial route recording	7.5.5	ePRR-s:M	ePRR-s:M
epPRR-r	<r>Partial route recording	7.5.5	ePRR-r:M	ePRR-r:M
epCSR-s	<s>Complete source routeing	7.5.4	eCSR:M	eCSR:M
epPSR-s	<s>Partial source routeing	7.5.4	ePSR:M	ePSR:M
epQOSM-s	<s>QOS maintenance	7.5.6	c1:M	c1:M
epQOSM-r	<r>QOS maintenance	7.5.6	c2:M	c2:M
epPri-s	<s>Priority	7.5.7	ePri-s:M	ePri-s:M
epPri-r	<r>Priority	7.5.7	ePri-r:M	ePri-r:M
epData-s	<s>Data	7.6	M	M
epData-r	<r>Data	7.6	M	M
epUnsup2	Are received PDUs containing parameters selecting unsupported Type 2 functions discarded and where appropriate an Error Report PDU generated?	6.21	M	M
epUnsup3	Are parameters selecting unsupported Type 3 functions ignored?	6.21	M	M

Table E-9 End Systems - Echo Reply (ERP) Parameters.

Note: Definition of conditional status entries:

c1: eQOSM-s OR eCong-s

c2: eQOSM-r OR eCong-r

Item	Timer	Reference (ISO/IEC 8473-1:1994)	Values	ISO Status	NAS Supports	Values Supported
eLifReas	Is reassembly timer <= received derived PDU lifetime ?	6.8		M	M	
eReasLim	Reassembly Timer	6.8	500ms to 127.5s			<= life- time

Table E-10 End Systems - Timers.

Item	Function	Reference (ISO/IEC 8473-1:1994)	ISO Status	NAS Supports
iPDVC	PDU composition	6.1	M	M
iPDVD	PDU decomposition	6.2	M	M
iHFA	Header format analysis	6.3	M	M
iPDUL	<s>PDU lifetime con- trol	6.4	M	M
iRout	Route PDU	6.5	M	M
iForw	Forward PDU	6.6	M	M
iSegm	Segment PDU	6.7	iDSNS:M	iDSNS:M
iReas	Reassemble PDU	6.8	iErsp:M	iErsp:M
iDisc	Discard PDU	6.9	M	M
iErep	Error reporting	6.10	M	M
iEdec	E<s>Heading error detection	6.11	M	M
iSecu	<s>Security	6.13	O	M
iCRR	<s>Complete route re- cording	6.15	O	O
iPRR	<s>Partial route re- cording	6.15	O	O
iCSR	Complete source route- ing	6.14	O	O
iPSR	Partial source route- ing	6.14	O	O
iPri	<s>Priority	6.17	O	M
iQOSM	<s>QOS maintenance	6.16	O	M
iCong	<s>Congestion notifi- cation	6.18	O	O
iPadd	<s>Padding	6.12	M	M
iEreq	Echo request	6.19	O	O
iErsp	Echo response	6.20	O	O
iSegS	Create segments small- er than necessary	6.8	O	O

IDSNS	Simultaneous support of subnetworks with different SN-Userdata sizes	6.7	0	0
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Table E-11 Intermediate System - Supported Functions.

Item	NPDV	Reference (ISO/IEC 8473-1:1994)	ISO Status	NAS Supports
IDT-t	DT(full proto- col)transmit	7.7	M	M
IDT-r	DT(full protocol)re- ceive	7.7	M	M
IDTNS-t	DT(non-segment- ing)transmit	7.7	M	M
IDTNS-r	DT(non-segmenting)re- ceive	7.7	M	M
IER-t	ER transmit	7.9	M	M
IER-r	ER receive	7.9	M	M
IERQ-t	ERQ transmit	7.10	IEReq:M	IEReq:M
IERQ-r	ERQ receive	7.10	M	M
IERP-t	ERP transmit	7.11	IERsp:M	IERsp:M
IERP-r	ERP receive	7.11	M	M

Table E-12 Intermediate System - Supported PDUs.

Item	Parameter	Reference (ISO/IEC 8473-1:1994)	ISO Status	NAS Supports
IdFxFt-s	<s>Fixed part	7.2	M	M
IdFxFt-r	<r>Fixed part	7.2	M	M
IdAddr-s	<s>Addresses	7.3	M	M
IdAddr-r	<r>Addresses	7.3	M	M
IdSeg-s	<s>Segmentation part	7.4	M	M
IdSeg-r	<r>Segmentation part	7.4	M	M
IdPadd-s	<s>Padding	7.5.2	M	M
IdPadd-r	<r>Padding	7.5.2	M	M
IdSecu-s	<s>Security	7.5.3	ISecu:M	ISecu:M
IdSecu-r	<r>Security	7.5.3	ISecu:M	ISecu:M
IdCRR-s	<s>Complete route re- cording	7.5.5	ICRR:M	ICRR:M

idCRR-r	<r>Complete route re-cording	7.5.5	iCRR:M	iCRR:M
idPRR-s	<s>Partial route re-cording	7.5.5	M	M
idPRR-r	<r>Partial route re-cording	7.5.5	iPRR:M	iPRR:M
idCSR-s	<s>Complete source routeing	7.5.4	iCSR:M	iCSR:M
idCSR-r	<r>Complete source routeing	7.5.4	iCSR:M	iCSR:M
idPSR-s	<s>Partial source routeing	7.5.4	M	M
idPSR-r	<r>Partial source routeing	7.5.4	iPSR:M	iPSR:M
idQOSM-s	<s>QOS maintenance	7.5.6	M	M
idQOSM-r	<r>QOS maintenance	7.5.6	c1:M	c1:M
idPri-s	<s>Priority	7.5.7	M	M
idPri-r	<r>Priority	7.5.7	iPri:M	iPri:M
idData-s	<s>Data	7.6	M	M
idData-r	<r>Data	7.6	M	M
idUnSup2	Are received PDUs containing parameters selecting unsupported Type 2 functions discarded and where appropriate an Error Report PDU generated?	6.21	M	M
idUnSup3	Are parameters selecting unsupported Type 3 functions ignored?	6.21	M	M

Table E-13 Intermediate System - Supported Data (DT) Parameters.

Note: Definition of conditional status entry:

c1: iQOSM OR iCong

Item	Parameter	Reference (ISO/IEC 8473-1:1994)	ISO Status	NAS Supports
ieFxFt-s	<s>Fixed part	7.2	M	M
ieFxFt-r	<r>Fixed part	7.2	M	M
ieAddr-s	<s>Addresses	7.3	M	M
ieAddr-r	<r>Addresses	7.3	M	M
iePadd-s	<s>Padding	7.5.2	M	M

iePadd-r	<r>Padding	7.5.2	M	M
ieSecu-s	<s>Security	7.5.3	iSecu:M	iSecu:M
ieSecu-r	<r>Security	7.5.3	iSecu:M	iSecu:M
ieCRR-s	<s>Complete route re- cording	7.5.5	iCRR:M	iCRR:M
ieCRR-r	<r>Complete route re- cording	7.5.5	iCRR:M	iCRR:M
iePRR-s	<s>Partial route re- cording	7.5.5	M	M

iePRR-r	<r>Partial route re- cording	7.5.5	iPRR:M	iPRR:M
ieCSR-s	<s>Complete source routeing	7.5.4	ieCSR:M	ieCSR:M
ieCSR-r	<r>Complete source routeing	7.5.4	ieCSR:M	ieCSR:M
iePSR-s	<s>Partial source routeing	7.5.4	M	M
iePSR-r	<r>Partial source routeing	7.5.4	iPSR:M	iPSR:M
ieQOSM-s	<s>QOS maintenance	7.5.6	M	M

ieQOSM-r	<r>QOS maintenance	7.5.6	c1:M	c1:M
iePri-s	<s>Priority	7.5.7	M	M
iePri-r	<r>Priority	7.5.7	iPri:M	iPri:M
ieDisc-s	<s>Reason for discard	7.9.5	M	M
ieDisc-r	<r>Reason for discard	7.9.5	M	M
ieData-s	<s>Data	7.9.6	M	M

ieData-r	<r>Data	7.9.6	M	M
ieUnSup2	Are received PDUs con- taining parameters se- lecting unsupported Type 2 functions dis- carded?	6.21	M	M
ieUnSup3	Are parameters select- ing Type 3 functions ignored?	6.21	M	M

Table E-14 Intermediate System - Supported Echo Report (ER) Parameters.

Note: Definition of conditional status entry:

c1: iQOSM OR iCong

Item	Parameter	Reference (ISO/IEC 8473-1:1994)	ISO Status	NAS Supports
iqFxFt-s	<s>Fixed part	7.2	M	M
iqFxFt-r	<r>Fixed part	7.2	M	M
iqAddr-s	<s>Addresses	7.3	M	M
iqAddr-r	<r>Addresses	7.3	M	M
iqSeg-s	<s>Segmentation part	7.4	M	M
iqSeg-r	<r>Segmentation part	7.4	M	M
lPadd-s	<s>Padding	7.5.2	M	M
lPadd-r	<r>Padding	7.5.2	M	M
iqSecu-s	<s>Security	7.5.3	iSecu:M	iSecu:M
iqSecu-r	<r>Security	7.5.3	iSecu:M	iSecu:M
iqCRR-s	<s>Complete route re- cording	7.5.5	iCRR:M	iCRR:M
iqCRR-r	<r>Complete route re- cording	7.5.5	iCRR:M	iCRR:M
iqPRR-s	<s>Partial route routing	7.5.5	iPRR:M	iPRR:M
iqPRR-r	<r>Partial route routing	7.5.5	iPRR:M	iPRR:M
iqCSR-s	<s>Complete source routing	7.5.4	iCSR:M	iCSR:M
iqCSR-r	<r>Complete source routing	7.5.4	iCSR:M	iCSR:M
iqPSR-s	<s>Partial source routing	7.5.4	M	M
iqPSR-r	<r>Partial source	7.5.4	iPSR:M	iPSR:M
iqQOSM-s	<s>QOS maintenance	7.5.6	M	M
iqQOSM-r	<r>QOS maintenance	7.5.6	ci:M	ci:M
iqPri-s	<s>Priority	7.5.7	M	M
iqPri-r	<r>Priority	7.5.7	iPri:M	iPri:M
iqData-s	<s>Data	7.6	M	M
iqData-r	<r>Data	7.6	M	M
iqUnsup2	Are received PDUs con- taining parameters se- lecting unsupported Type 2 functions dis- carded and where ap- propriate an Error Re- port PDU generated?	6.21	M	M
iqUnsup3	Are parameters select- ing unsupported Type 3 functions ignored?	6.21	M	M

Table E-15 Intermediate System - Supported Echo Request (ERQ) Parameters.

Note: Definition of conditional status entry:

c1: IQOSM OR iCong

Item	Parameter	Reference (ISO/IEC 8473-1:1994)	ISO Status	NAS Supports
ipFxFt-s	<s>Fixed part	7.2	M	M
ipFxFt-r	<r>Fixed part	7.2	M	M
ipAddr-s	<s>Addresses	7.3	M	M
ipAddr-r	<r>Addresses	7.3	M	M
ipSeg-s	<s>Segmentation part	7.4	M	M

ipSeg-r	<r>Segmentation part	7.4	M	M
ipPadd-s	<s>Padding	7.5.2	M	M
ipPadd-r	<r>Padding	7.5.2	M	M
ipSecu-s	<s>Security	7.5.3	iSecu:M	iSecu:M
ipSecu-r	<r>Security	7.5.3	iSecu:M	iSecu:M
ipCRR-s	<s>Complete route re- cording	7.5.5	iCRR:M	iCRR:M

iqCRR-r	<r>Complete route re- cording	7.5.5	iCRR:M	iCRR:M
ipPRR-s	<s>Partial route re- cording	7.5.5	M	M
ipPRR-r	<r>Partial route re- cording	7.5.5	iPRR:M	iPRR:M
ipCSR-s	<s>Complete source routeing	7.5.4	iCSR:M	iCSR:M
ipCSR-r	<r>Complete source routeing	7.5.4	iCSR:M	iCSR:M
ipPSR-s	<s>Partial source routeing	7.5.4	M	M

ipPSR-r	<r>Partial source routeing	7.5.4	iPSR:M	iPSR:M
ipQOSM-s	<s>QOS maintenance	7.5.6	M	M
ipQOSM-r	<r>QOS maintenance	7.5.6	c1:M	c1:M
ipPri-s	<s>Priority	7.5.7	M	M
ipPri-r	<r>Priority	7.5.7	iPri:M	iPri:M
ipData-s	<s>Data	7.6	M	M

ipData-r	<r>Data	7.6	M	M
ipUnsup2	Are received PDUs containing parameters selecting unsupported Type 2 functions discarded and where appropriate an Error Report PDU generated?	6.21	M	M
ipUnsup3	Are parameters selecting unsupported Type 3 functions ignored?	6.21	M	M

Table E-16 Intermediate System - Supported Echo Reply (ERP) Parameters.

Note: Definition of conditional status entry:

c1: IQOSM OR iCong

Item	Timer	Reference (ISO/IEC 8473-1:1994)	ISO Status	Values	NAS Supports
iLifReas	Is reassembly timer <= received derived PDU life-time?	6.8	iReas:M		iReas:M
iReasLim	Reassembly Timer	6.8		500ms to 127.5s	

Table E-17 Intermediate System - Supported Timer and Parameter Values.

APPENDIX F

Profile Requirements List (PRL)

ISO 8473-2 Protocol for providing the connectionless-mode network service

When ISO 8802-2 is used as a subnetwork to support NAS service, the following PRLs shall apply.

Item	Function	Reference (ISO/IEC 8473-2:1994)	ISO Status	NAS Supports
S802SNUD	Is Subnetwork User Data of at least 512 octets transferred transparently by the SNDCF?	5.2	M	M
S802SNTD	Is Transit Delay determined by the SNDCF prior to the processing of user data?	5.2	M	M

Table F-1 Subnetwork Dependent Convergence Functions SNDCF For Use With

ISO/IEC 8802 Subnetworks - Functions.

Item	Dependency	Reference (ISO/IEC 8473-2:1994)	ISO Requirement
S802SSg-r	<r>Maximum SN data unit size (Rx)	5.2	>= 512
S802SSg-t	<s>Maximum SN data unit size (Tx)	5.2	>= 512

Table F-2 Subnetwork Dependent Convergence Functions SNDCF For Use With

ISO/IEC 8802 Subnetworks - Multilayer Dependencies

Note:

ANNEX A (PICS Proforma) of ISO 8473-2:1994 can be referenced for additional information.